

# COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper — Second-class postage paid at Chicago, Illinois

Vol. IV No. 21

May 27, 1970

Price: \$9/year

## IBM's Variable Micrologic Offers Bonus and Challenge

By Peter L. Briggs  
CW Research Editor

Variable micrologic, a principal feature of the upcoming IBM NS family of computers [CW, May 20], presents both a challenge and a bonus to future users.

The ability to alter the basic instruction set to fit changing needs, different machine envi-

ronments, and almost unlimited compatibility with various earlier types of processors gives the user more freedom to take advantage of higher performance and more flexibility in design.

The tremendous difficulty associated with learning micrologic programming, and the need for highly skilled and experienced

micrologic programmers will present serious problems for the first few years.

IBM will probably not provide any type of software to help the user work with programmable micrologic. Reportedly, this decision is based on the near-impossibility of maintaining systems software in a machine

that does not have a consistent instruction set.

### Big Gain for Users

The first big gain, for users, will be overall 360 compatibility. Though IBM could never announce inter-manufacturer compatibility, because of the antitrust problems, outside soft-

ware companies could certainly jump on the bandwagon. Eventually, all these different types of compatibility could probably be integrated into the operating system of the NS, and hence work at least as well as the current Compatibility Operating System (COS) from IBM.

(Continued on Page 4)

## Honeywell-GE Merger Should Benefit Users

By Edward J. Bride  
CW Staff Writer

NEW YORK — Users of General Electric and Honeywell computers appear to have many advantages in the proposed "merger" talks now going on, although system incompatibility will have to be one of the first problems tackled by the proposed "third corporation."

The two companies announced last Wednesday that they planned a new entity, essentially a Honeywell subsidiary, to be formed from both computer operations, but that "development and support of the current product lines" would continue.

The new corporation, 81-1/2% to be owned by Honeywell, would include all of Honeywell's computer operations, and all of General Electric's business computers, except time-sharing in the U.S. and Canada, and G.E. process control computers.

Users would thus have a greater choice of peripherals from a single source, such as GE terminals on Honeywell computers.

The incompatibility problem arises in upgrading present systems. The next upgrade for the user of "third corporation equipment" might not necessarily be compatible with current systems.

Users would be able to obtain a wider variety of computer equip-

ment from a single source, and would also have the advantage of Honeywell's larger service support.

### Government to Challenge?

Some observers predicted a rocky road for the merger plans, since the two companies have approximately equal 4% segments of the worldwide computer market.

This 4-4 split falls within the realm of automatic challenge by the Justice Department, whose guidelines say that mergers by companies whose market shares are 4-4, 10-2, or 15-1 will be challenged.

A Honeywell source countered that "we would not have entered into negotiations if we didn't think the merger would have been allowed." He added that the Justice Department had encouraged competition against the dominant industry force, IBM, and that the merger would encourage such competition.

Even if the proposed third corporation does not damage IBM's domination, the consolidation would surpass Univac as number two in the computer market.

### Incompatibility

The question of system compatibility is pure conjecture: as of now, there is none. A GE user suggested, however, that devel-

(Continued on Page 4)



Firemen climb in window through which gasoline bombs were thrown. One suspect has been apprehended and charged with arson and conspiracy. (UPI Telephoto)



"This WAS my computer," ... Woodrow Shumat, DP manager (CW Wirephoto)

## Programmer Thankful for 'Bug' During Computer Center Bombing

By Phyllis Huggins  
CW West Coast Bureau

FRESNO, Calif. — A bug in a computer program may have saved the life of Jerry Polaski, night operator at the Fresno State College Computer Center. He had left the operations center one night last week to ask a programmer what to do about a problem in a program that was

compiling a list of all graduating students.

Returning to the center he heard glass break. When he opened the door, he saw the CPU of the new Control Data Corp. 3150, valued at \$500,000, engulfed in flames.

Three Molotov cocktails thrown by protesting Mexican-American and black students hit the core memory, which immediately exploded.

"I didn't think it was a bomb at first. In fact, I didn't think anything for a couple of hours. I'm sure glad to be here now," Polaski said.

The window-smashing followed a recommendation by an administrator that eight of 12 ethnic studies faculty members not be rehired.

### No Permanent Data Loss

Immediate concern was what effect the bombing would have on graduation and grades. According to Russ Mitchell, admissions officer, there may not be

any graduation services since records cannot be restored in time. Because of the college's practice

(Continued on Page 4)

## NCR Century Users Surveyed

## Users Plagued By Disk Crashes

By Peter L. Briggs  
And Edward Mooney

CW Research Staff

NCR Century 100 users are having disk crash problems on a fairly wide basis. Many installations reported that these problems were concentrated within the first six to eight months of installation.

Among the types of problems users noted were assembly errors, poor initial design, environmental problems, and constant field changes.

NCR indicated that it was constantly improving the drive, while realizing that problems do

exist. The engineering changes that have been instituted since initial installations have been designed to eliminate specific sources of problems, the company said.

Computerworld surveyed 108 users representing about 10% of the Century 100s installed. Fifty users reported problems and 46 reported no problems with NCR disks. The remaining 12 users declined interviews.

Of the 50 who were having or had disk crash problems, 19 were still having crash problems at the time of the interviews.

To compare the NCR group

with the rest of the industry, CW surveyed about 50 sites using other manufacturer's equipment, particularly that of IBM, Honeywell, and RCA. Of the 50 contacted, under 10% were having or had disk crash difficulties, compared with over 50% for NCR users.

### What Is Disk Crash?

A disk crash occurs when either dirt buildup between head and rotating surface cause the head to scratch the disk, or when the actual head comes into contact with the moving surface.

(Continued on Page 2)

### On the Inside

L-T Files Damage  
Suit Against IBM

— Page 35

DP Accessories Supplement follows Page . . .	20
Business/Industry . . .	29
Editorials . . .	10
Education . . .	25
Financial . . .	35
Societies . . .	28
Software/Services . . .	15
Systems/Peripherals . . .	21



# Survey Cites Disk Problems of NCR Century 100 Users

(Continued from Page 1)

In the first type of crash, the disk surface may be only slightly damaged. If the damage is both slight and accessible, the NCR field engineer may repair the surface in the field by polishing the spot scratched. For more serious gouges, the disk is returned to NCR and replaced at no charge to the user.

User complaints revolved around lost time, unrecoverable data, and the need to recreate entire files from source data when serious damage results from a crash.

NCR offers a dual-spindle disk drive, where each spindle has a capacity of about 4 million characters. On the Century 100, with integral disks, a dual-spindle unit rents for about \$600/mo.

By comparison, the IBM 2311 stores 7 million characters on one disk and, including controller, rents for about \$1,050/mo for a single drive.

Access time is about the same for the NCR and the IBM drives (57 and 60 msec, respectively). Cost per bit is higher, with each pack costing \$350 and storing 4 million characters, as opposed to \$490 per pack storing 7 million characters from IBM.

## Many Causes Reported

Of the 96 sites contacted, 21 could not define the cause of their disk crashes, 10 indicated that dirt got into the drives, six attributed the problem to faulty design or assembly, five reported excessively low humidity as the problem, and others cited miscellaneous causes like field engineering errors and general environmental problems.

Humidity control caused particular annoyance and complaints. When the C100 was announced, no environmental controls were required. After having repeated

problems with low-humidity areas, NCR changed its specifications from a nominal 10% to 90% relative humidity to 40% to 60%. Users had to install humidity control equipment to keep their systems running. NCR indicated that low humidity caused more static electricity buildup on the heads, which attracted more dirt.

In an unrelated incident, one user reported that he needed to rebuild his floors. It seems that every time he walked across his computer room, the floor vibrated so badly that it would cause the disk drives to shake, and this occasionally produced a disk crash.

Some users reported that, when one disk crashed, the other spindle in the same cabinet would also crash. Surface particles from the first crash would contaminate the air in the other drive.

## NCR Well Liked

In the entire group surveyed, 75 users still felt that they were satisfied with NCR, overall. The remaining 21 indicated dissatisfaction with NCR equipment or with NCR itself. Among this group were several who were unsatisfied with the software as well as the hardware.

Three users had already replaced Century 100s with other manufacturer's equipment, mainly IBM. One user despaired of ever getting his systems running, and went back to punched cards, he said.

## NCR Efforts

NCR has spent many months redesigning its disk drive. Better air filtering, better air circulation, pack redesign, and redesign of the mounting spindle to prevent off-center mounting were among the engineering alterations.

In spite of these alterations, new installations continue to have head crashes, users say, and older installations have recurring problems.

Other users mentioned particular assembly problems. Incorrectly installed air filters, missing covers and filter baffles, missing inter-drive panels to keep the compartments separate were field-installed. In one site the field engineers were repairing a wiring harness, a user said, and left loose solder inside the access circuitry, causing several days of difficulties. NCR commented that some of the field engineering work might be the installation of retro-fitted changes

(equipment that was planned after the device was built and had to be installed in the field).

## Secondary Problem

Head misalignment was frequently cited as a problem, even among users who were not having disk crash problems.

Eighteen percent of the users surveyed had this problem, causing file recreation and data rebuilding. Occasionally, when the heads were realigned, the data became unreadable because it had been written when the heads were out of line, users said. While agreeing that this problem was far less severe than

the disk crash problem, they were frequently annoyed by the need to recreate files.

In two particular cases, users said that NCR had placed the burden of proof as to whether a crash occurred on the users. These users were most irate about this kind of company response.

## Service Thought Excellent

The users indicated a general happiness with NCR's service people. Even where installations were some distance from the nearest service center, the users felt that NCR's response time and training level were excellent.

## NCR Statement on Century 100s

Early installations of NCR Century 100 systems were closely monitored in order to evaluate overall system performance as well as the operation of individual units.

As a result of this evaluation, two modifications were made to the disk unit shortly after initial deliveries began. These were: addition of a top guard to the disk pack to provide balanced air flow over the disk and changing the spindle so that an operator could not mount a disk improperly. All systems now installed incorporate these changes.

Subsequently, two additional modifications, one to improve the head loading mechanism and the other to increase the unit's internal air pressure, were effected. These modifications began on production units during the latter part of 1969 and are currently being retro-fitted to all units produced prior to that time. The costs of such field modifications, which are not unusual in the industry, are borne by the company.

All units currently in production include these modifications. Comprehensive field reports from hundreds of installations show the reliability of the Century 100 disk unit is now satisfactory in all respects, with thousands of hours of crash-free operation being achieved by the average user. Many users have never experienced a head crash.

Head crashes can occur, of course, with any type of disk unit. In its April 15 issue, for example, *Computerworld* described a new device developed by a West Coast firm [Royco Instruments] which warns of an impending crash in time for preventive action to be taken. In citing the reason for such a development, *Computerworld* said: "Head crashes are a major area of concern to computer operators."

The article then listed several specific models of disk files on which the firm marketing the head crash detector is concentrating its efforts. None of the models listed was of NCR manufacture.

[A Royco spokesman told CW that the head crash detection system was not yet being used on NCR equipment because the manufacturer had not given Royco the necessary disk operating data.]

[He added, however, that numerous inquiries about the crash detection system had been received from NCR users. He said there was no reason to believe that the head crash detection system would not work with the NCR equipment.]

In the event a head crash should occur in a Century system, in most cases the system is back on the air within an hour. Damage to the head or disk, if any, is completely covered by NCR's maintenance policies which are among the most liberal in the industry.

The vast majority of head crashes on all types of disk units are caused by contamination such as dust particles. Low humidity, which creates excess static electricity, aggravates the contamination problem to a limited extent.

When deliveries of the Century 100 began, the humidity specification range was 25%-88%. This was subsequently changed to a range of 40%-60% which is consistent with the industry for systems comparable to the Century.

According to *Computerworld's* survey, 46 out of 96 Century users who responded had never experienced a head crash problem. Of the 50 reporting a problem, 28 said it had now been solved. However, 19 users, or 20% of the responding sample, indicated they were still having a problem.

In comparing CW's survey with the sample of other manufacturers' disk units, three facts should be kept in mind:

- A number of the Century systems currently in use have not yet received the more recent modifications.
- Head crashes on oxide-coated disks often are not immediately detected as is the case with NCR's plated disk. Instead, the cumulative effect of undetected head crashes is frequently diagnosed as disk deterioration or unexplained data misreads.
- Industry experience has shown conclusively that any type of hardware or software problem is most apparent in the early months of an installation.

Since the NCR Century series is one of the industry's newest computer families, and since most of the 1,000 systems produced to date have been installed in recent months, it is not surprising that the frequency of head crashes would be somewhat higher than that of computer families nearing the end of their life cycles and systems which have, on the average, been installed for long periods of time.

CAC'S

Computerworld  
SALES Corner

## COMPUTERS

LOADED  
1401-12K System  
With 729 Tapes  
And/or 1311 Disks

•  
Economical  
1440-8K System  
With 1311 Disks

•  
380-30 85K  
CPU & 1052

•  
1401-4 K System  
All features

## SPECIAL

519 w/27 Pos. M.S.  
088 I Collator

Punched Card  
Equipment

We need:  
557 I  
047 w/keyboard

ALL EQUIPMENT UNDER M/A

WRITE  
↓  
CALL • (404) 458-4425

Computer  
Acquisitions  
Company

P.O. BOX 80188  
ATLANTA, GEORGIA 30328

POSTMASTER: CHANGE OF  
ADDRESS FORM 3579 to be  
sent to Computerworld Circulation  
Dept., 797 Washington, New-  
ton, Mass. 02160.

## SELLING LEASING



DATA AUTOMATION  
SERVICES, INC.

4858 CASH ROAD  
DALLAS, TEXAS 75247

[Home Office: (214) 637-6570]

318 West 28th Street  
Los Angeles, Cal. 90007  
(213) 747-0587

7790 N.W. 7th Ave.  
Miami, Fla. 33150  
(305) 693-3911

1850 DeKalb Ave. N.E.  
Atlanta, Ga. 30307  
(404) 377-3962

6366 Gross Point Rd.  
Niles, Illinois 60648  
(312) 647-0166

1401 COMPUTERS  
Sale - Purchase - Lease

1401 Systems wanted now  
or will purchase leaseback  
until your release date

All Model 1401s  
available for sale or lease

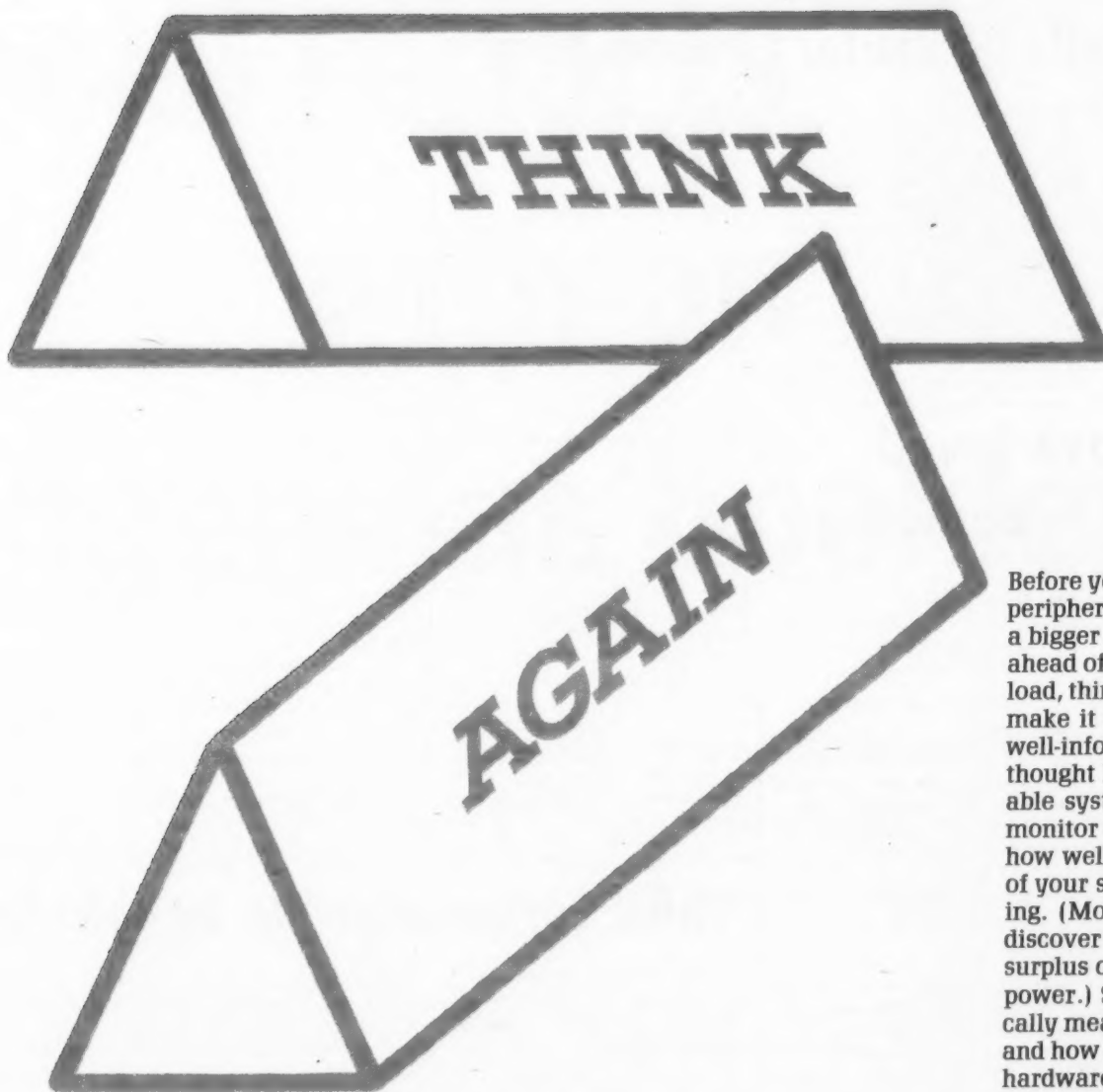
Unit Record Equipment  
For Sale or Lease

024 026 082 083 084  
085 087 088 402 403  
407 514 519 552 602

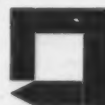
ALL WITH IBM M A  
(also 7330, 1311, 729 drives)

Unit Record Wanted

Will purchase all types of  
unit record equipment now  
with or without IBM M A



Before you pile on more peripherals or graduate to a bigger computer to keep ahead of your processing load, think again. And make it an exceptionally well-informed second thought by using our portable system utilization monitor to learn exactly how well every element of your system is performing. (Most installations discover an embarrassing surplus of computing power.) SUM automatically measures how often and how long every hardware and software element of your system is used during a run. Simultaneously, with no interference or degradation. Data is recorded on IBM compatible tape, then processed by a SUM analysis and report program. The resulting report shows conclusively (both numerically and graphically) the exact utilization of each system element relative to real time and run time. Composite tabulations show interrelationships of all components. It's all right there in black and white. Exactly where and why your system isn't being utilized to maximum advantage. And what to do about it. Ready to think again? To arrange a demonstration, call (408) 247-0200 or write, Computer Synectics, 283 Brokaw Road, Santa Clara, California 95050.





# Overall 360 Compatibility Possible With Micrologic

(Continued from Page 1)

With users already simulating a 7040 that is itself simulating a 650 Ramac, the addition of a 360 simulation on the top will certainly reduce operating efficiency. Four nested simulators are probably beyond the capability of even the NS equipment, at present.

Design flexibility, a feature that was noticeably lacking in the 360, will allow users who rent their systems to take advantage of new changes in logic and control features without costly hardware modifications. It seems quite likely that such alterations would come under the heading of operating software, and hence

not be a separately charged program at present.

## Big Troubles Ahead

At present, there are probably about 500 to 1,000 people in the U.S. who have some familiarity with micrologic programming in any form. Many engineers who have designed micrologic

for current computer systems could acquire the knowledge easily enough, but they will have trouble doing so until the formal IBM announcement.

Most of the existing talent is within IBM. True, there could be a mass migration from within IBM, and new companies formed that specialize in micrologic, but this too would take time.

Some micrologic experts feel that the minimum training time for a competent micrologic programmer is about one year, nearly full-time. This would preclude users sending their current systems programmers to short courses for training, certainly.

## What is It?

Micrologic programming involves the definition of a particular function, as an algorithm, just like ordinary programming. However, after the algorithm has been defined, then the necessary functions must be programmed from a set of basic logic instructions in binary or machine language.

This type of machine language has little relationship to the kind of instructions users might be used to in regular machines. There is no operation code, no operands. Operands and operation codes are what are being defined.

The instruction to be executed is supplied in special registers to the micrologic executors. The operand is decoded, by other micrologic routines, and the appropriate logic routine activated. The decoding logic presents the operand addresses and data addresses in internal registers. The

processing micrologic then examines all the supplied information for consistency, address validity, and format.

If all basic criteria are met, the execution processor attempts to execute the instruction. Whenever an error occurs, special interrupt routines must be called that can reroute processing to error handlers.

These error handlers must have top priority in execution, and all other classes of interrupts must be temporarily suspended. This means that the entire routine must execute within the length of time that other interrupts can be queued, or they will be permanently lost.

The IBM 360 operates completely around such chains of interrupts, and it is probably that the NS will have similar architecture.

Users desiring to alter the micrologic will have serious problems. It will require thorough knowledge of the interrupt processing cycles, the capabilities of the internal micrologic basic instruction set, and an understanding of how hardware functions, nearly at the level of an engineer.

The industry may be breeding as esoteric a group of highly paid specialists as it has ever seen. Certainly, the eventual solution will require operating systems that can also support the varying nature of micrologic. This has been the biggest problem for Standard Computer Corp. in building its IC-7000 for Call-A-Computer. It will probably take IBM a while to find a solution within the NS series.

## Eyewitness Tells of Center Firebombing

The following is an eyewitness account by Jerry Polaski, computer operator at Fresno State College, who had left the operations center to consult a programmer about a problem in the program he was running.

I was returning from the key-punch room through the operations control room when I heard shattering glass in the operations center about 35 ft away from me. I ran through the EAM (tab)

room and up the ramp into the operations center where John Howard (research technician) said, "There goes your disk file."

The mainframe was engulfed in flames and smoke poured from the back of the machine. We closed the doors to the operations center and yelled for everyone to clear the area. I guess at this point I became panicky.

On my way back through the EAM equipment room I hit the

stop button on the operating MG converter in a futile attempt to cut off electricity to the operations center.

I then called security and reported a fire in the computer center and left the center premises. I yelled at everyone in the hall and adjoining rooms. Someone, I don't know who, had already set off the fire alarm. I ran up the stairs to the second floor and again hollered to clear the building. I came back down and started herding people out of the building.

I went outside as fire trucks started arriving. Two firemen were running toward the windows where smoke was pouring out and flames were visible. The firemen had water-type extinguishers and I told them it was an electrical fire. I am not sure if they had already sprayed water into the flames or not. The firemen then applied a chemical extinguisher to the flames.

A security officer had arrived and I entered the building with him. By this time, all the students had left the building.

salvage some parts. A completely new system will be supplied to Fresno State in two weeks when it is expected that the computer center will be restored.

## Central Processor Hit

The firebombs made a direct hit on the central processor and that unit was the most seriously damaged. The rest of the equipment was damaged by the intense heat which welded circuitry and by water damage. Heat was so great that the fluorescent lighting tubes in the room were melted.

According to Woodrow Shumat, manager of DP services at the center, all programs stored in the room at the time were destroyed as well as all tapes and disks. The total extent of damage is still being inventoried, but may double the \$500,000 damage to the computer system itself.

Karl Falk, acting president of the college said: "The destruction last night at the computer center may affect the lives of all students relative to grades, graduation, and records. Attempts will be made to utilize other computer facilities, but delays in receiving grades and other information will be obvious."

## 'Bug' May Have Saved Programmer in Bombing

(Continued from Page 1)

of storing all records on microfilm and having these kept in two separate places, one on campus and one outside, there is the magnetic tape records of no permanent loss of data. But student information will have to be rebuilt.

It is not expected to affect student admissions into graduate school or next semester's work since application for admission is made early, and the transcript of data is sent at a later time. Officials feel the deadline can still be met. Until the center is restored, computer work is being processed at the centers of two other state colleges.

The CDC 3150 system has a 16K-word memory, a card reader with control unit, line printer with control unit, two 854 2-million word disk drives with control unit, card punch, two 608 magnetic tape drives and control units, and a communications modem.

Floyd Dunn, account representative with CDC, said that although the system was under a 30 day test and was not insured by the university, it was insured by CDC. The entire system will be shipped back to CDC headquarters in Minneapolis to try to

## 'Third Corporation' to Benefit Users

(Continued from Page 1)

opment of compilers would solve the problem of software compatibility.

Other sources speculated that the next family of computers would arrive before complete compatibility is achieved.

Since GE's time-sharing efforts in the U.S. and Canada are not included in the proposal, Honeywell's unsuccessful time-sharing division will be competing against GE's, with both obtaining parts and services from the same sources.

GE's T/S division has been quite successful, although it has grown rapidly and lost money last year.

Honeywell's biggest seller and possibly most reliable computer has been the H-200, a medium size system which will undoubtedly replace GE's defunct 200 line. GE has large computers in its 600 series.

## Complete Ladder of Systems

Users would thus be able to climb a complete ladder of systems, once the incompatibility problem is solved.

The proposal is subject to the approval of both boards of directors, and, of course, to the receipt of any necessary government approvals.

GE will get about a quarter of a billion dollars in securities and notes, if the deal is approved. Honeywell would manage the new company.

Replying to concern over

Honeywell's stock decline, board Chairman James H. Binger predicted "no dilution in earnings" because of the agreement.

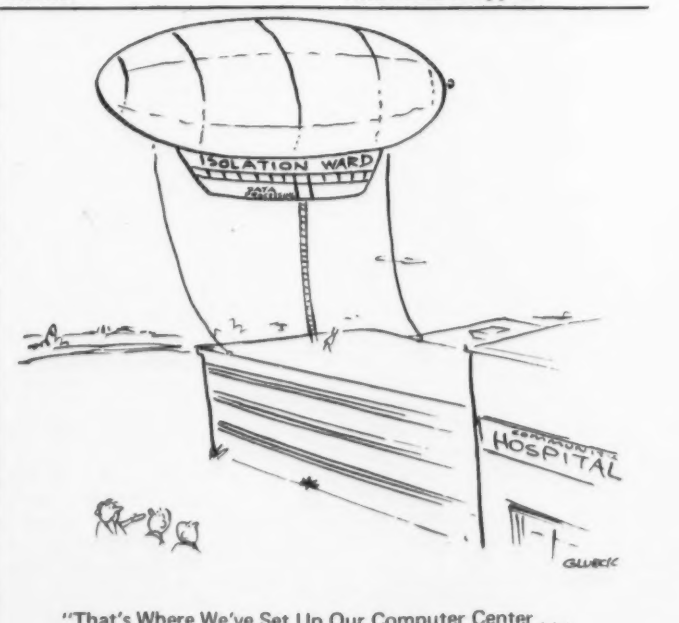
He added that certain economies could be made, including the elimination of duplication in research and development efforts.

In a prepared statement, General Electric's board chairman Fred J. Borch said that General Electric's board Chairman Fred J. Borch said that fully, both in terms of sales and service."

Both companies contend that business will continue as normal until the final settlement is made.

Users have speculated that, in the long run, the desirable features and options on GE and Honeywell equipment will be implemented on "third corporation" computers.

Others add that "third corporation" computers will be used in GE timesharing, and Honeywell's unsuccessful efforts in this field could disappear.



"That's Where We've Set Up Our Computer Center . . ."



**COMPUTERWORLD**  
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

TM Reg. U.S. Pat. Off.

Weekly newspaper — Second-class postage paid at Chicago, Ill. Published weekly (except: a single combined issue for the last week in December and first week in January) by Computerworld, Inc., 25 E. Chestnut St., Chicago, Ill. 60611. ©1970 by Computerworld, Inc.

Send all editorial and subscription material to: Computerworld, 797 Washington St., Newton, Mass. 02160. Telephone: (617) 332-5606. TWX: 710-335-6635.

Robert M. Patterson, Executive Editor. V.J. Farmer, News Editor. Neal Wilder, National Sales Manager. Margaret Phelan, Circulation Manager. Henry Fling, Art Services Supervisor.

W. Walter Boyd, Publication Manager. Patrick J. McGovern, Publisher. Reproduction of material appearing in Computerworld is strictly forbidden without written permission. Send all requests for permission to the Publication Manager.

Subscription rates: \$9 for one year, \$20 for three years. Add \$1 per year for Canada; \$4.50 per year for other foreign. Foreign air mail rates available on request.

BPA membership applied for

POSTMASTER: Send Form 3579 (Change of Address) to: Computerworld Circulation Dept., 797 Washington St., Newton, Mass. 02160



# "RSVP whips out special reports with an ingenious booklet"



Bruce Forsberg of NCI, Atlanta

"It's the darndest booklet imaginable. So simple anyone can use it. And it is designed exactly the way people think. If an executive wants to know something, he just "talks" it to the booklet. Exactly the way he would say it to his secretary or his staff. Only he checks a few boxes and fills in a few blanks. No computer terminology to learn. No special languages to fool with.

"To make sure it stays simple, easy and effective, we designed the Report Request booklet first. Then we designed the system.

"And management loves it. No more frustrations. No more talking with programmers. No more disruption of schedules. No more long waits.

"An executive whips through the booklet in 15 minutes or so. DP punches a few cards, usually less than a dozen. Stacks it in the job stream and the report comes hustling out. A load-and-go system that ends one of the most aggravating nuisances in the business. The special report.

"Write today for the details on RSVP. And just wait until you see the booklet and how it works!"

# NCI

NATIONAL COMPUTING INDUSTRIES  
3003 NORTH CENTRAL AVENUE, PHOENIX, ARIZONA 85012 TELEPHONE 602: 264-1394



Subsidiary of CONTINENTAL TELEPHONE CORPORATION

An Equal Opportunity Employer

# Town Opens 'Hornet's Nest' With Access to Printout

INGLEWOOD, Calif. — This town is embroiled in a controversy that has resulted in its revising the city charter to open up computerized records for public inspection.

In a decision that is still under fire from the chairman of a citizens committee, the city council voted to require that the

computer memory be dumped every six months so that the public can have access to records stored there. This could mean that a five-foot stack of printout will replace the previous means of access to public records which was to go to the specific ledgers or books to find the information.

Cost to the city for the printout is estimated at \$2,400 annually.

Whether this massive stack of printout will hinder public inspection simply by its volume is not known since the system has not yet been tested in use. The charter also includes the provision that any specific records,

such as pay vouchers for a specific councilman, will be produced on request by a citizen within a 24-hour period.

It was decided to make them unavailable on the spot since interruption of work at the computer center could greatly increase operation costs for the data processing center. There will be a fee charged if more than two requests are made per week. In addition, copies of specific documents will be supplied at a cost of 50 cents a page.

## Necessary Policies

According to city attorney Donald Olson, "Policies for inspection of public records are necessary. The Inglewood charter provision was enacted at a time when all books and records were in traditional files. These would have been readily available for public inspection. Since installation of a computer, information that would ordinarily have been written in book record form, has, for the most part, been converted and stored on magnetic tapes or punched cards which can only be read through a computer." Olson said that computerization of records would make information more readily available to fulfill the

public's "need to know."

Inglewood has just recently begun computerization of all its records and is the first city in California to revise its charter to meet the computer age.

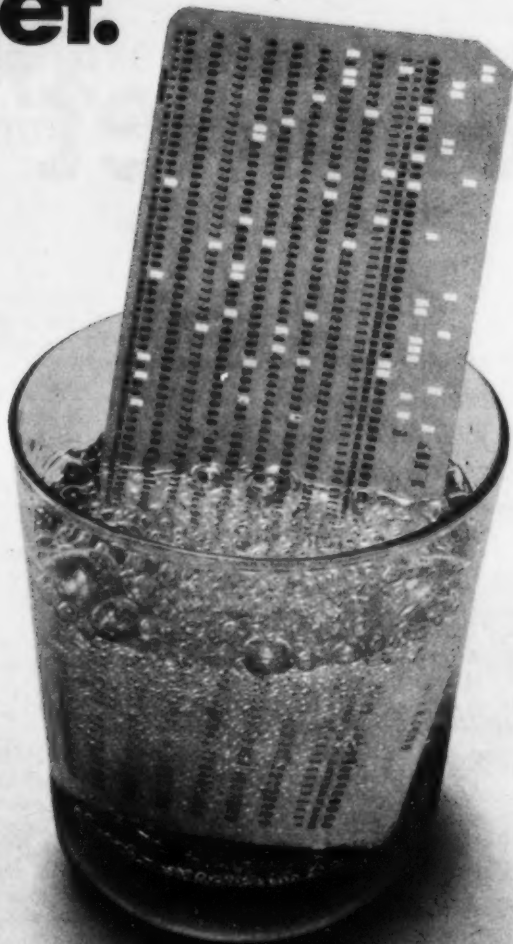
There is, however, a bill before the state assembly which would establish requirements and guidelines for non-confidential state and local computerized records.

According to Bob McWhirk, aide to assemblyman William T. Bagley, sponsor of the bill, it puts requirements on state and local agencies to permit public access to records. As he put it, "It extends the public records act to include computer systems. State agencies have in some cases been telling the public that due to the computer storage problem it is too hard to get to information, records are not available, etc."

"The system of access to computer records has not been clear in the past." The bill will require all state and local agencies to detail procedures to assure that everyone has the right to access of public records.

The bill is number L982 and is appropriately called "the computer bill of rights."

## Business headaches and computer relief.



Corporate headaches come from doing business without all the answers. Or from not doing business because you're waiting for the answers.

Because while computers are amazingly quick, inefficiencies in systems and programs slow them down considerably.

And loss of speed in market reaction usually means loss of revenues. Corporate relief? Dylakor Computer Systems.

The developments Dylakor has made in software systems offer startlingly quick answers and intelligent information processing. Answers for specific projects or general consultation work.

Answers in tailor-made software programs, service bureau work, even complete computer facilities management.

In short, Dylakor can offer you computer relief that will end most of your information headaches.

# DYLAKOR

Dylakor Computer Systems, Inc., 11914 Washington Blvd., Los Angeles, Calif. 90066, Phone (213) 391-6257

## Computerized Car Pool Aids College Traffic Congestion

COLLEGE PARK, Md. — Students at the University of Maryland are using a computerized car pool to help alleviate the university's massive traffic and parking dilemma.

The service, University Computers Association, uses an IBM keypunch, card-sorting equipment, and a printer to help students form car pools with other students, according to Dan Swensen, student services adviser and university services committee representative.

To help solve the traffic and parking problem, the association had interested students fill out cards containing name, address, telephone number, Zip code, and other information regarding their commuting status — for example, whether they had cars, or needed rides, Swensen said.

This information was then keypunched, sorted according to Zip code, and printed. Students then looked under their Zip codes to find other students in the same area with cars or who needed rides.

About 400 students took part in the free service this semester, Swensen said. Next semester, however, it is expected that the service will become a class project in which many more students will participate.

The project has received the blessing of university officials.

Jerrold L. Witsil, superintendent of public safety and security for the university, said that the project is bound to help the university's parking situation in the long run, even if only two or three people get together to form a car pool.

At present, about 27,000 cars are used to bring students to the university daily, but only 5,800 parking spaces are available. As a result, from 9,000 to 20,000

traffic tickets are issued each semester, Swensen said.

In addition to the parking problem, the car pool will help reduce air pollution in the area from exhaust fumes, he said.

## KQED TV Offers Services Of DP Companies

SAN FRANCISCO — Area data processing companies have pooled interests and resources with the local educational television station, in preparation for the station's 16th annual auction.

The station, KQED, channel 9, sells products and services offered by local merchants on a charitable-donation basis.

The computer portion of this year's telephone-selling effort takes place on Friday, May 29, between 9-10 p.m. local time. The auction takes place all week.

Among the items being offered during this portion of the auction are the following:

- Computer Synergy Inc., of Oakland, offers two man-days of computer programming, assessed at \$224; three hours of IBM 360/30 time (64K, five disks, two tapes) valued at \$195; and 20 hours of IBM 360/20 time, valued at \$600.

- Control Data Corp., of Palo Alto, two half-hour segments, on Saturdays, of CDC 6600 time, valued at \$360 each.

- Greyhound Computer Corp., of San Francisco, one hour of computer time (available are a 360/40 and a 2314), \$160.

- Diversified Computer Applications, Palo Alto, four hours of computer time on its Burroughs B2500 system, \$360.



# Wanna see how fast we can deliver a PDP-8/L?

# Wanna see it again?

Digital Equipment Corporation  
Maynard, Mass. (617) 897-5111

**digital**  
COMPUTERS • MODULES

**DPMA DPMA DPMA DPMA**

**San Francisco:**  
Bill Healey  
(415) 362-8547

Such an achievement would be a significant extension of the work in numerical modeling of the atmosphere and of the ocean circulation now being carried out in several laboratories, Lorenz said.



Powerful as PDP-11's CPU is, it is right down with the peripherals, plugged into the UNIBUS® just like they are.

Now the devices are independent, asynchronous. They can send data to each other—or direct to memory—along the bus without addressing the CPU. Memory can transfer to memory. New devices, or memory, can join the system by just plugging in.

The UNIBUS makes PDP-11 infinitely variable, infinitely expandable. Even the pluggable CPU can be replaced. Altogether, PDP-11 is the most versatile small computer system ever made.

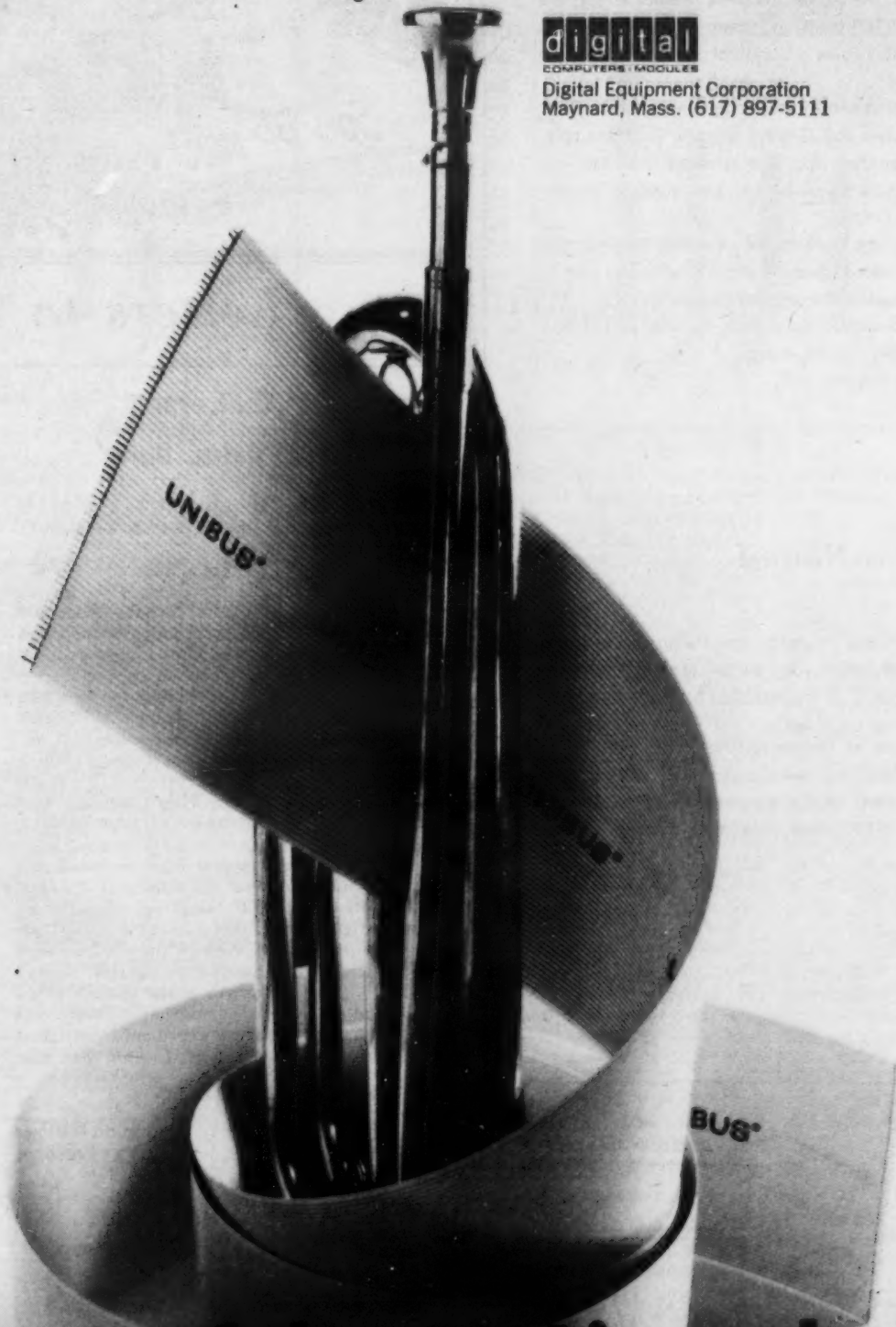
Small? Over 400 instructions. Eight general registers: bit, byte, word, and multi-word capability. Up to 32K 16-bit words, 64K bytes, optional to 128K 16-bit words, 256K bytes. Hardware stacking capability. Automatic nesting of interrupts and subroutines. Re-entrant and relocatable code. Multiple channel DMA. Prices starting at \$10,800 including Teletype and 4K of core.

Actually, PDP-11 can be small when you want it to be. But only in memory (dedicated 1K read-only, plus 256 words of read-write) and in price: \$7700.00.

The mini-computer bureaucracy will never be the same again.

**digital**  
COMPUTERS • MODULES

Digital Equipment Corporation  
Maynard, Mass. (617) 897-5111



**PDP-11:  
The tyranny of the CPU is ended.  
The peripherals are restless.  
Anything can happen now.**

## Editorials

### Will the User Benefit?

The proposed "merger" of Honeywell's and GE's general-purpose computer divisions would affect the users of some 7,100 installed systems around the world and the potential users of another 1,100 systems on order.

The joint statement by the companies notes: "The present Honeywell and General Electric products complement one another, and it is intended that the new company continue development and support of the current product lines."

This holds out the hope to the user that the proposed new company would combine the strengths and eliminate the weaknesses of the separate companies.

If this promise should come true, the user would be a primary beneficiary of the merger.

But only time will tell.

### Users Lose a Round

Dr. H.R.J. "Herb" Grosch, the Ralph Nader of the computer industry, has been sacked from his position as director of the National Bureau of Standards Center for Computer Science.

Grosch expects to remain on the scene as a research fellow reporting to the new director of the center.

Early conclusion: Grosch has not lost his voice but he has lost much of his power to fight for the user.



## Letters to the Editor

### 'Data, Dayta' Controversy Also Includes 'Dotta, Dater'

Sardonic columnist Strickland [CW, April 29] is not only a "datta" dilettante, but also a maladroit conductor of surveys.

That "only 55% of the population says 'dayta'" is not to infer that the remaining 45% consists only of conventional "datta" liberals. Strickland fails to consider the wooly thinking leftists who persist in affecting the banal "dotta," apparently a manifestation of the "Dotty Syndrome." Nor does he publicly recognize those hard-lining right-wingers who cling to "dater," thought by laymen to emanate from regional speech peculiarities, but known by professionals to reflect the Freudian overtones of an asexual adolescence.

Extensive research by Lou Harris indicates that the "dotta" and "dater" camps represent 11% and 6% of the population respectively, leaving only 28% for the "datta" people! I am surprised and concerned, therefore, that the usually astute Doctor Definitive failed to challenge Strickland's assumptive legerdemain that a "great majority" for "dayta" does not exist. Perhaps the good doctor's credentials are also suspect; after all, real "dayta" men know that assumption is the mother of all screwing-up. Perhaps the rumor that Definitive was a "datta" man who found it expedient to switch at the height of the McCarthy era is more than base calumny. After all, McCarthy (Charlie) was a blockhead of record size!

Gordon I. Ulmer  
Vice-President

Connecticut Bank & Trust Co.  
Hartford, Conn.

### 'Systems Man' Is Unsung Hero, A Translator of Business Needs

I have two comments to make on the May 13 viewpoint article by Milton C. Spett ("It's Ability That Counts...").

1. Without a reasonable amount of experience behind him, how can we separate "... anyone with the drive and imagination to be a successful systems analyst..." from the many other imaginative drivers who just can't cut the mustard?

2. The mere fact of having acquired a certain amount of (successful) experience, pretty well testifies to a man's ability.

I suggest, as many others have I'm sure, that it is easier to teach the rudiments of EDP to a good man in the user department than it is to teach business practice to the hot-shot EDP analyst.

Further, there is another, and more senior, branch of systems which Spett has completely overlooked, and that is the systems man, per se. He is neither tied to a "user" department, nor to

the EDP discipline. He looks on the computer as just another tool, extremely useful when properly tamed, but still a tool. He is perhaps more than anything else, a go-between, a translator of business needs (in business terms) to the technical people who talk mostly computerese and vice versa. He must be knowledgeable and able in both areas. This is the man who should guide the computer-analysts and programmers, and Heaven help us if he isn't experienced.

Charles F. Johnson  
Data Systems Manager

Ronson Hydraulic Units Corp.  
Duarte, Calif.

### Compo Well Publicized, Show Sponsor Says

A recent article in *Computerworld* [April 15] reviewing our Compo West Show contained a misquote. Your reporter quoted Compo management as stating that we "ran an ad in the *Los Angeles Times*."

The fact is that we ran 23 sizable display ads in West Coast newspapers, including five ads in the *Los Angeles Times*, two in the *San Francisco Examiner*, one in the western issue of the *Wall Street Journal* and 15 ads in regional local newspapers, which were hand picked by leading western computer accounts as being very well read by a large portion of the business community.

Since your reporter's misquote followed a paragraph deploring the lack of Compo West attendance, we feel this inaccuracy provided your readers with a completely wrong impression of our attendance promotion efforts and its results.

As a matter of fact, Compo West was very well attended. Most exhibitors were pleased with both the quality and the number of attendees, resulting in a high renewal rate from past exhibitors plus a great deal of interest on the part of companies who were not with Compo in 1970.

Bernard Lane  
President

Show World, Inc.  
New York

Most exhibitors said they were happy with the show, but they also told our staff writer that they were dissatisfied with the publicity support. Whether this complaint was justified is another question. Ed.

*Computerworld* welcomes comments from its readers. Preference will be given to letters of 250 words or less. *Computerworld* reserves the right to edit letters for purposes of clarity and brevity. Letters should be addressed to: Editor, *Computerworld*, 797 Washington Street, Newton, Mass. 02160.



# A Consideration of Characteristics of Wastage Case

In earlier columns we have noted that there are two different approaches to attacking the possibility of improving throughput once the profile of a program is known — either by concentrating on the area when the Dominant Unit is not operational (the Wastage Area) or the

we can concentrate upon the 20% area that lies above the CPU's 80%.

Theoretically, there is no reason why this percentage should not be 100%. The central processor is apparently the most used unit — yet something is holding it up during this period.

with the Dominant Unit, then the Wastage Area is eliminated.

Figures 3 and 4 may bring this point out more clearly. Here, instead of the use of bar charts giving overall percentages we are using time-based diagrams to show the relations between the working of the dominant and

However, it is not really as simple as that in practice. The point is that while the improver knows that the overlapping operation is the area where the attention is most needed, he does not know which set of overlapping is involved. And there are many sets of

control quickly following it into action as before.

Under these circumstances the central processor does not have to wait for the disk control before starting its next cycle, and so saves 20% of the original time — or 20 minutes if the program originally took 100

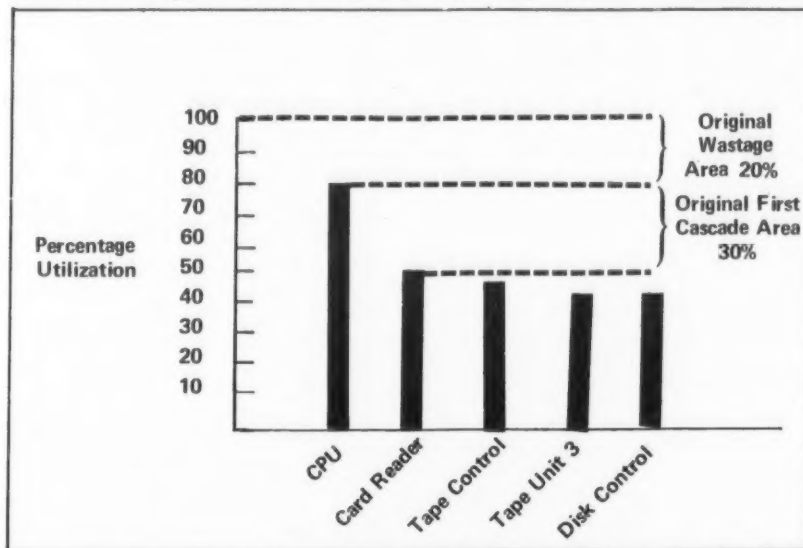


Figure 1 — Before

area when only the Dominant Unit is operational (the First Cascade).

Examining the First Cascade case, it was pointed out that savings here were possible through changes in the use of the Dominant Unit itself, and without any other unit being involved. This characteristic was called the "singularity" characteristic of the First Cascade approach. This article contains the equivalent consideration of the characteristics of the wastage case, as opposed to the First Cascade case.

Copies of the earlier articles are available from Alan Taylor.

During the consideration of the First Cascade approach, we postulated a program profile where the central processing unit was operational 80% of the time, and no other unit was used more than 50% of the time (Figure 1). In that case we concentrated on the 30% area that separated the two. Now, taking the same case

If these hold-ups can be eliminated, the other units can carry out their work while the proces-

non-dominant units. Note that in the first case — while the wastage area still exists, the use of the non-dominant units lap into the area when the dominant is idle — while after some rearrangement (Figure 4) they no longer do this.

These pictures show the problem that an improver faces if he is wanting to improve throughput by reducing the amount of time involved in the Wastage Area. He has to reduce or eliminate the lack of overlap between the dominant and the other units.

## Theory Simple . . .

Doing this is theoretically a simple operation — the throughput improvement must simply buffer the actual operations of the dominant and/or the non-dominant units a bit more. This can often be done just by preparing new control cards — and may not even need a recompilation.

## The Taylor Report

By Alan Taylor



sor is working — rather than asking the processor to wait while they are working.

In short, if the non-dominant units were 100% overlapped

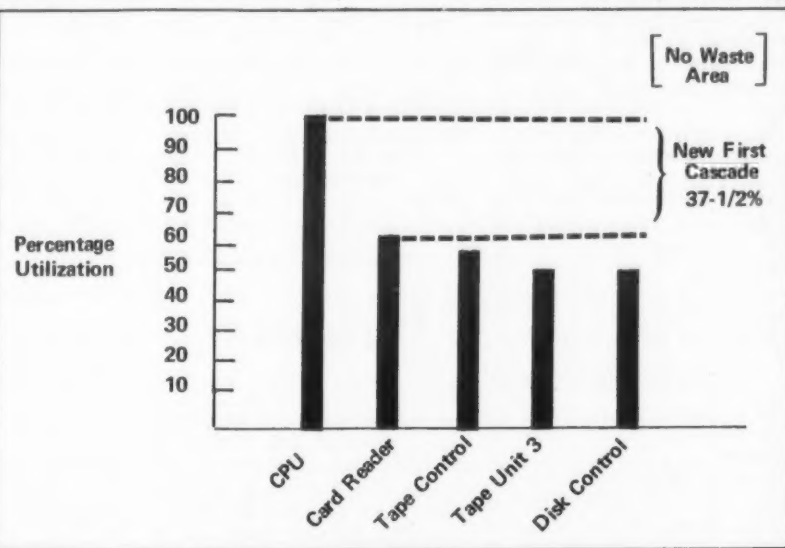


Figure 2 — After

possible overlap as there are independent units. It may be that the printer is not overlapped properly, or it may be that it is the card reader or the tape control unit, or anything at all.

It may even be that it is a combination of more than one case!

So that while the solution to

minutes to run. This represents a throughput improvement of 25%.

Naturally, the waste area, which previously was 20%, has now been eliminated, and there still is a First Cascade area representing 30 minutes. However, this is now 30 minutes out of 80, rather than 30 out of 100 as it was originally, and so represents 37-1/2% up from its original figure of 30%.

## 'Plurality' Characteristic

This improvement has been done simply by rearranging the times when the various units work, while leaving unaltered the amount of work that they perform. However, the behavior of a number of units has had to be correctly interpreted, rather than the improver being able to concentrate his attention upon a simple case, and therefore the characteristic of obtaining profit from measurement in the Wastage Area is "plurality" rather than singularity as was the case in the First Cascade area.

With these fundamental points out of the way, we can go on to consider not simply where the profit lies — but also how to reach it which is a different matter altogether.

© Copyright 1970 Alan Taylor. Reproduction in whole or part forbidden. The views expressed in this column do not necessarily reflect those of Computerworld.

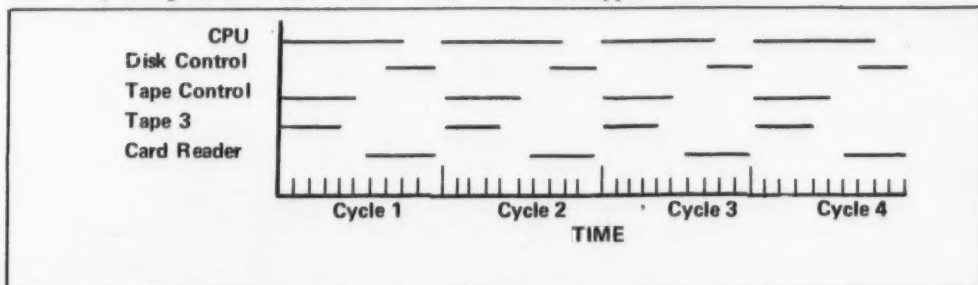


Figure 3 — Before re-arrangement of the utilization of various units, the Central Processor is being held up at the end of each cycle waiting for the Card Reader and the Disk Control to finish their activities.

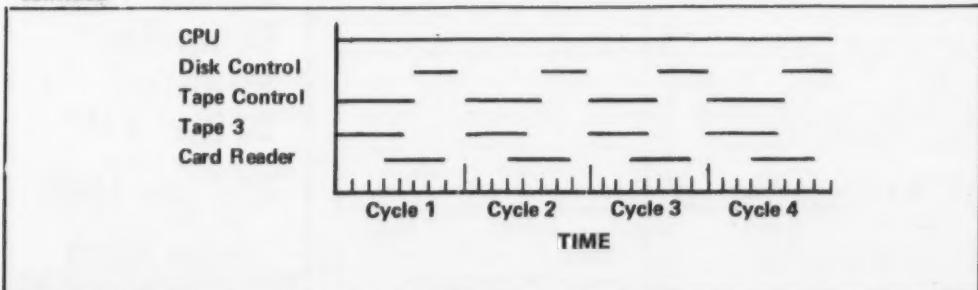


Figure 4 — After re-arrangement of the utilization of various units with the Card Reader and the Disk Control completing their work before the Central Processor, so allowing the second cycle to start immediately after the central processor (which is the dominant unit) has completed the first cycle.

Alan Taylor, consultant, writer, and former editor of *Computerworld*, is president of Computer Management Aids Corp. of Framingham, Mass.

the problem of eliminating the wastage is theoretically the simple one of just adding buffers, the practice is complicated because there are many different situations, involving in each case at least two units, which will show the same wastage profiles — and which he has to handle in different ways. As a result, the characteristic of using the wastage area is "complexity" while the basic characteristic of the first cascade was singularity to increase throughput.

## Summary

The overall effect is shown in Figure 2. To construct this we have adopted the rearrangement of the various computer unit utilizations as in Figure 4, with the card reader being started earlier in the cycle, and the disk

**WANTED**  
**XEROX DATA SYSTEMS**  
**Model 92 Computer**  
**8K or Larger**

Contact: A.J. Arenholz  
**SANDIA LABORATORIES**  
Division 9428 Albuquerque, N.M. 87115  
(505) 264-3153

## A Look at Systems Analysts — Part III

# What a 30-Minute Personal Interview Can Tell You

By Milton C. Spett

Special to Computerworld

To the average EDP manager it appears that only a tiny minority of systems analysts, and likely none of his, possesses the qualities listed in the previous articles [CW, May 20]. The fact is that while only a minority do possess these qualities, that minority is far larger than most would suspect.

The overwhelming majority of systems departments have such a formal chain of command and such a rigid project structuring system that most of the potentially outstanding systems analysts are totally stifled and frustrated. To find such systems analysts, therefore, is not so difficult as it may appear.

### Personal Interview

Each ability may be tested for the observed in the personal interview:

**Business of analysis** — Ask the applicant to pick the best system he has developed and then ask why he considers it the best. If he emphasizes the complexity of the system and its technical virtues, he is a computer analyst.

If, on the other hand, he is most proud of the system's contribution to the company, he is a business analyst. Cost reduction is, of course, an obvious benefit. Better information should not, however, be taken as a definite company benefit.

It is necessary to pursue the matter further and determine specifically how this information will be used and which profit-making decisions will be improved. The word of the using

department is not enough to prove that the information is necessary, and the analyst who accepts this without question is not truly business oriented.

### Applicant's Answers

**Organization** — The critical point to observe is the structuring of the applicant's answers. If he answers each question thoroughly and clearly, logically moving from point to point, he will have the ability to do the same with his projects. If he rambles and goes off on tangents, he will show a similar lack of organization on his projects.

## Viewpoint

It is also revealing to ask superlative questions such as what is the "best system" or what is the "worst thing" about his present job. If he has trouble identifying a single, significant point, he will probably lack the same organizing ability when he is working on a project.

It is also important to look for enthusiasm and commitment in the interview. An applicant who gives all the right questions and answers without emotion will not have the drive and aggressiveness necessary to move a project from the beginning to end.

### Precision of Answers

**Skepticism** — This quality shows itself in the degree of precision in the applicant's an-

swers. The applicant whose answers are filled with platitudes rather than precise statements will be just as vague in his understanding of the business problems with which he would later be grappling. The systems analyst who strikes at the heart of each matter and makes sure that he understands it fully will show the same precision in his choice of words to convey precisely what he intends to say.

**Imagination** — This quality is shown in the applicant's questions as well as his answers. He should ask questions which are significant to his future job satisfaction in addition to the more usual questions about salary policy and the organization of the department. For example, he might ask about how the department determines which projects will be undertaken or where the EDP department fits into the company organization chart.

It is important also to look for a man who makes at least one significant statement that is new to the interviewer. Otherwise it is easy to mistake agreement for intelligence.

It can also be helpful to ask him questions about his previous companies which do not directly relate to his specific jobs. The truly imaginative systems analyst will have turned his intelligence to areas which were beyond his particular responsibility, while the more traditional man will restrict his analysis to the specific jobs assigned to him.

### Criticism Without Rancor

**Politics** — It is quite provoking to ask the applicant to evaluate

his present boss. This is highly sensitive area for most people, and the answer is often quite revealing. A bitter tirade shows hostility which will prevent him from forming good relationships with most of the people he must work with. The failure to make any significant criticism indicates a subservience which will hamper his image as a creative, aggressive force. The ideal response is substantial, objective criticism without rancor or animosity.

### Talk About Problems

**Frustration tolerance** — This quality can also be judged by getting the applicant to talk about the problems with his previous jobs, particularly his current job. If he takes the attitude that he just cannot stand it any longer, he probably has a low frustration tolerance. If, on the other hand, he recognizes that any organization will present him with substantial problems, but those at his present job are neither challenging nor show much chance for solution, he probably has a high frustration tolerance. He should be looking for a positive move that will give him an interesting challenge rather than just getting him away from a bad situation.

But if he limits his questions to assuring himself that his new company will not have the problems of his old company, he not only is running away from a problem but he also lacks the discipline to make sure that his new company has none of the weaknesses he dislikes. He will probably go from one company to the next, each time having a perfectly valid reason for leaving.

The more important question is why did he allow himself to join so many poor companies. It is likely that each of his systems projects also suffered from the errors of others which he failed to recognize and rectify.

### Words, Not Looks

Finally, it is important to listen very carefully to the words actually used by the applicant. Our judgment is often colored by his looks, his manner, his style of dress, and other prejudices which are unrelated to job performance.

The businesslike, polished, personable applicant can often be very attractive, although he possesses few of the qualities needed to do the job. In fact, this type of person will usually have an overwhelming desire to please everyone and therefore be afraid to show the aggressiveness and imagination needed to do the job. The truly self-confident individual, however, does not feel it necessary to devote much energy to outward appearances.

Milton C. Spett is manager of data processing for the Industrial Gas Division of the Air Reduction Co.

**UNDER \$50-K COM**

### 2. Will it work with your software?

Any computer output microfilmer that can accept your computer's output without learning a new language has a decided edge over one that cannot. The PTI 1300 can; it accepts any standard print tape format.

757 North Pastoria Avenue  
Sunnyvale, California 94086  
(408) 732-4940

**PERIPHERAL TECHNOLOGY INCORPORATED**

**Reduce Your Computer Print-Out to 8½" x 11"**

Xerox copies  
**\$25. per 1000**

Minimum charge \$10  
**SPEEDY SERVICE POWER COMPUTER SYSTEMS, INC.**

Rt. 3 and Meadow Road, Rutherford, N.J.  
N.Y. 07070

# VENDERE

PROFESSIONAL MARKETING SERVICES FOR THE COMPUTER INDUSTRY

VENDERE INTERNATIONAL MARKETING CORP.

WELLS FARGO BANK BUILDING SUITE 225 DEL AMO FINANCIAL CENTER TORRANCE CALIFORNIA 90503 (213) 542-3861

**If**

you are managing a DP operation — or are putting together a management information system . . .

your budget is limited, your staff small, and your computer not a giant . . .

your management needs reports that are based on file information . . .

then — you have problems of creating, maintaining, and retrieving information from files.

These are severe problems when your management needs customized reports quickly but there is no easy way for them to generate their own. You, or your staff, must do this for them. Results? Fair to good, but never 100% satisfying.

Until now there has been no easy answer. FILE EXEC 70 is a system that your managers can learn to use in two days. It is not necessary for them to write programs, but only specify parameters. Users only need to know the external characteristics. As DP manager, you may wish detailed information on internal characteristics of FILE EXEC 70 to evaluate it.

First there is the *System Description* covering characteristics of language types and forms, modes of use, file media, documentation, etc. *Data Structure* includes types of groups, entries, files, and their identifications. *Functions* precisely defines the preceding items and also covers interrogation, selection criteria, file creation, etc. *Storage Structure* specifies storage representation for item levels, entry and group levels, file levels, and multiple files. *Operational Environment* gives details of basic and expanded hardware, software, and systems requirements. Prices are also provided.



**Pioneer Data Systems**  
Suite 308, Merle Hay Tower  
Des Moines, Iowa 50310 (515) 276-6746

**MARKETING OF TERMINALS AND TERMINAL ORIENTED SYSTEMS**

OUR FORTE.

For Details Write:

Wm. H. Mestler  
Mestler Industries  
P.O. Box 716, Tarzana, Ca. 91356  
Or Call: (213) 344-0419

**CUT COMPUTER COSTS IBM MODEL 25, 30, 40, 50 USERS**

It is no longer necessary to struggle alone in EDP. You can now share a computer with other compatible users in your area. We will form this group for you, establish the Shared Service Center\*, and then provide continuing management of the Center. The result—a lower cost to you. Unlike timesharing, this approach is intended for commercial applications. For further information write: President, The Silber System Inc., 430 East 56th Street, New York, New York 10022.

THE SILBER SYSTEM INC.



## Compare the IBM 360/20 with the NCR Century 100.

A benchmark study, recently performed by an independent consultant, compares the NCR Century 100 with the IBM 360/20 Models 2 and 4. This study points out that the NCR Century 100's total throughput is faster, more efficient. In fact, it indicates the NCR Century to be 23 per cent to 43 per cent more productive.

We believe our NCR Century 100 offers more performance per dollar than any system on the market. Its memory is in the 800-nanosecond range. Its dual disc unit stores more than 8.3 million characters and accesses data at an average of 43.7 ms. Monolithic integrated circuitry, more reliable than hybrid circuitry, is standard throughout the NCR Century system. Printing speeds range from 450 to 3,000 LPM. The NCR Century offers low-cost on-line capabilities if your needs demand this requirement.

The NCR Century 100 offers three lan-

guages: COBOL, FORTRAN, AND NEAT/3. It has an RPG Translator that easily converts 360/20 RPG source programs to NEAT/3. A full-scale operating system includes complete monitor control, a conditional job control language, a three-year operational calendar for job scheduling, continuous logging of computer operations—and more. And when you step up to the NCR Century, you gain full access to NCR's big library of applied systems.

For its capacity and throughput, we believe our NCR Century 100 is the lowest-priced computer in the industry. On the average, it's 30 per cent lower in cost than the 360/20 Model 2.

There's more to tell, of course. And we have a factual booklet that describes how much performance you could be getting with the NCR Century 100. For your free copy, write EDP Advertising, NCR, Dayton, Ohio 45409. Or talk to your NCR computer man.



**THINK**

# Think again.

**NCR<sup>®</sup>**  
**Computers**

NCR is proud to be the sponsor of the Space Exploration Exhibit  
in the United States Pavilion at Expo '70, Osaka, Japan.

# Date for National Computer Year Start Still in Doubt

NEW YORK — Although plans are under way for the proposed National Computer Year (NCY), it would be "premature" to discuss a starting date for the year, according to John J. Alexander Jr., vice-president of the New York Stock Exchange and president pro tem of the ad hoc committee.

Alexander told CW that the "gestation period" would probably be more than one year. This would push the earliest possible start for the year to mid-1971.

The planning stages for the International Geophysical Year

took over five years of concentrated effort.

## Two Other Assignments

The ad hoc committee has two other specific assignments in addition to working out the general goals for the year, Alexander said. First it will consider the question of sponsorship for the year and the related problem of funding and then it will attempt to define specific projects that should be carried out during the year.

The ad hoc committee, Alexander said, wants to present the

coordinating committee that established it with a "quality" program for the year when it meets next. To develop this type of program may take longer than the original two-month deadline set by the coordinating committee, he said.

If more time is needed for these initial moves, Alexander told CW, the committee would ask the coordinating committee for an extension in the charter of the ad hoc planning group.

At present, however, the ad hoc planning group hopes to have a reasonably concrete plan drawn up and adopted by the coordinating committee to act on by sometime this summer. It is hoped that the 40 associations that comprise the coordinating committee would be able to present the program to their individual membership at their fall meetings.

If the individual societies each adopt the program, they then could draw up their plans for participation in the fall, and the concept of the National Computer Year could then be worked into 1971 budgets if financial support is requested from the individual societies.

The other possibilities of support under discussion include the possibility of foundation support and the idea of possible government support, sources close to NCY said.

Also, computer users and others will be able to express

their feelings on the program for NCY through a series of questionnaires soon to be released by NCY organizers.

The ad hoc committee, appointed last month in Washington, D.C., [CW, April 29] to lay the groundwork for the year, decided at its initial meeting last week to poll interested parties for their views on the year before attempting to draw up a formal plan of action.

Members of the ad hoc plan-

ning committee include: Barry W. Boehm, American Institute of Aeronautical and Astronautical Engineers; Alec Bumsted, Association of Educational Data Systems; John Jacka, National League of Cities; Herbert R. Koller, the American Society for Information Science, which represents Aflps; John H. McLeod Jr., Simulation Councils, Inc.; and Noel K. Zakin, American Institute of Certified Public Accountants.

## Computer Crosses Nations To Locate Kidney Donor

MANCHESTER, England — A transplant patient here recently received a kidney that had been located in Switzerland by a computer and flown to England by jet plane.

Doctors said that no local donor could be found so they contacted Eurotransplant, a European organization with headquarters in the Netherlands.

The Eurotransplant computer located a suitable donor in Berne, Switzerland, and made arrangements to fly the kidney to Britain.

In Manchester, a doctor from the Royal Infirmary was waiting to accept the flask containing the kidney. A police escort then rushed him to the hospital where a team of surgeons was standing

by. Doctors said that the operation went off "uneventfully."

## Assessor's Office Pleased

EVERETT, Wash. — The county assessor's office is pleased with performance of the new computer system's service section. All the assessor's records have been programmed into the IBM 360-B, and stations in the assessor's office can talk directly with the computer without going through any intermediate staff.

Given the proper signal, the computer will be able to print out tax statements for every parcel of property in the county in 72 hours. It currently takes about five months to do the same job.

## 360/20, 2401-3 FOR SALE OR LEASE

IPS has for sale or lease and immediate delivery from its own inventory a 360/20 system and one 2401-3 tape drive. The 360/20 is a C1, 8K with 2203-A1 Printer, 2501-A1 Card Reader, and 2560-A1 MFCM. Price: \$62,500. The 2401-3 90KB drive is available for \$19,000 as a 7-track unit or \$22,500 as a 9-track unit. Both items also available for 2 - 5 year lease. Please call or write for additional information. Also write for our Bulletins listing other computer equipment for sale or lease.

**IPS**

(201) 871-4200

INFORMATION PROCESSING SYSTEMS, INC.

467 SYLVAN AVENUE, ENGLEWOOD CLIFFS, NEW JERSEY 07632  
1307 Palo Alto Office Center Palo Alto, California (415) 328-4433

**MARGEN™**



**Don't turn down management's requests for information.**

Use MARGEN, Randolph Computer Corporation's **MANagement Report GENerator**. Gives you reports in hours, not days. Ideal for one-time and non-repetitive reports. Dramatic time savings on cross-tabulated reports.

Easy to use. Just lay out the report form, punch your program directly from the layout, load and go.

For use on IBM and RCA systems. Does not require the creation of intermediate files — any standard file which can be read sequentially can be used with MARGEN.

If you're merely evaluating software programs, write for literature. But if your interest is immediate, get your decision-makers together and phone right now for an on-site demo. We'll bring the contract. You will see your program requests run on your computer under your operating system.

**R C C RANDOLPH COMPUTER CORPORATION**

1425 East McMillan St., Cincinnati, O. 45206 • (513) 961-5400  
Offices in principal cities.

## computer center planning & scheduling seminar FREE FOR MANAGEMENT PERSONNEL



Synergistic Cybernetics, Inc. is giving a series of seminars showing how the **DEADLINE!** Computer Center Planning & Scheduling System can reduce late reports, reduce overtime and generally add to the efficiency of your computer center.

Attendees will have the opportunity to present their own problems and participate in discussions with other experienced senior personnel following the formal presentation. You are cordially invited to write or call for a reservation form to: Seminar Registrar, Synergistic Cybernetics, Inc., 7777 Leesburg Pike, Falls Church, Va. 22043. (703) 821-2500.

### DATES & LOCATIONS: (9:00 to 12:00 A.M.)

Pittsburgh	May 28	New York City	June 4
Washington, D.C.	June 2	Montreal	June 5
Boston	June 3	New Orleans	June 12

**SCI** SYNERGISTIC CYBERNETICS INCORPORATED



May 27, 1970

Page 15

# MIT Center Says ASMG Saves 20% in Assembly Time

By Don Leavitt  
CW Staff Writer

WATERLOO, Ontario — Users of IBM OS/360 Assembler level F can get average savings of from 20% to 30% in assembly time by switching to Assembler level G (ASMG), developed by the University of Waterloo. That is the claim of the Information Processing Center at MIT, which has

recently begun to use ASMG heavily.

In addition to speed of assembly, ASMG is said to provide a batch processor for small assemblies, and load-and-go capability for immediate testing of program modules. It also allows the selection of optional instruction sets to be recognized by the assembler, MIT said.

The assembly output can be cut sharply in size. The cross-reference dictionary has a more compact format than under the IBM assembler, and the printing of the external reference and relocation dictionaries can be suppressed completely under ASMG, according to MIT.

ASMG is said to be able to assemble larger programs than

IBM's Assembler F, by allowing the unsubstituted dictionary area to be greater than 64K. Another modification is said to allow the linking of unlike data sets, or data sets on unlike devices, to be supported for Sysin.

The assembler is described as source-language compatible with Assembler F, and, MIT said, "no changes were made in any way" to the input when used on ASMG.

The EXEC card in the job stream allows various options under ASMG, including BATCH and EXECUTE, which can be used separately or jointly. BATCH, by itself, allows sequential assembly of several source decks. EXECUTE, by itself, causes the object module resulting from an assembly to be loaded into core and executed, under control of other limiting options. Using both BATCH and EXECUTE together is said to cause each program to be executed immediately after its assembly.

The formatting of the cross-reference dictionary provides the same information as with Assembler F but the elements are

separated by commas, instead of listed in separate columns. Users who wish the Assembler F format can specify that as an option.

A wide range of diagnostic messages unique to ASMG are provided in order to highlight situations that are not covered by Assembler F.

## Operates Under OS/360

ASMG operates under OS/360 and requires a problem program partition of at least 84K, according to a Waterloo spokesman. A larger partition increases the assembler's efficiency, he added.

Various revisions have been made in ASMG since it was first released and these have been passed along to current users, the university said.

Waterloo said that, technically, the ASMG package is available to interested users without cost, but that because the university does provide the updated releases and systems support in the event of any apparent bugs in the assembler, there is a one-time maintenance charge of \$300.

## Profit II Inventory Management System For Data Storage Suited for Tape, Disk

WELLESLEY HILLS, Mass. — An inventory management system that uses either magnetic tape or disk packs, or both, for information storage has been developed for Honeywell Series 200 users by the firm's EDP Division.

The system, called Profit II, is said to include advanced forecasting techniques that reflect both life-cycle and seasonal trends, efficient ordering techniques for independent or joint item replenishment, expedient warehouse delivery schedules and automatic system maintenance to assure optimum processing.

Honeywell said that Profit II was developed to provide distributors with an integrated management information and control system that provides the best customer service at the least total cost.

Through the system, a distributor can immediately recognize market fluctuations in item demand and vendor activity and then adjust his inventory to meet these changing market conditions, the company said.

To implement Profit II, a distributor must first determine a

level of inventory that is both competitive and economical. The system then provides the optimum or least total cost inventory level to support this service level, Honeywell said.

The Profit II user-prepared data base consists of item information such as demand history, current costs, order multiples, product group number, etc., and vendor information such as purchasing and inventory carrying costs and discount information. The system continually processes and updates this data base to project future usage and to calculate economic order strategies.

The inventory system is said to use a statistical forecasting method called "exponential smoothing" to estimate future stock demands. The system calculates nine forecasts by using three types of trends, and within each trend, applies three types of smoothing constants.

The Profit II inventory system can also reflect seasonal variations, calculate safety stock, determine an optimum inventory level for an item by applying a standard economic formula, and determine the best ordering strategy, Honeywell said.

Profit II is available at no cost to current users of Honeywell Series 200 computer systems or with an order for a new system, the firm said. The system is available in three versions — a 4-tape system that requires a Series 200 computer with main memory of 20,480 characters; a 3-disk system with Series 200 main memory of 24,576 characters or a tape and disk system with 28,672 characters of main memory on a Series 200 computer.

## DSI Cobol Compiler IBM-Compatible, Gives 360/20 Users Disk Alternative

PARAMUS, N.J. — Users of the 360/20, long limited to the core-consuming RPG as a principal language, now have two versions of a Cobol compiler from Decision Systems, Inc. (DSI) to consider.

Including all the features of the tape-oriented compiler released last fall, a new disk version of DSI Cobol-20, which allows indexed, sequential, and direct access file structures, is available,

the company said.

The developer said that DSI-Cobol-20 is completely compatible upward with existing IBM Cobol compilers. This is expected to make the transition to larger systems much easier for users who outgrow the Model 20.

Availability of Cobol for the Model 20 is also expected to solve two major user problems: documentation of programs, and obtaining programmers, many of whom do not want to work exclusively in RPG.

The disk version of the compiler is said to include class tests, I/O options, logical IF statements, and the OCCURS clause.

Code generated by the Cobol-20 compiler is described as highly efficient, allowing much larger programs than are possible with IBM's RPG. One user of DSI Cobol-20, contacted by CW, cited the associated core savings

as one of the aspects he liked best about the compiler.

On a sample program sent to CW, the output looked excellent. The listing was in standard card-image Cobol format and the core map was described as adequate. No diagnostics were shown, but the company claimed that the compiler provided excellent warnings for most types of Cobol syntax and usage errors.

The disk version requires a 16K memory, DSI said, as compared to the 8K needed by the tape version of Cobol-20.

The developer said that the disk version is available for approximately \$10,000 as a one-time charge. On a rental plan, DSI said, it costs \$420/mo over two years, \$300/mo over three years, or \$200/mo over five years.

Decision Systems Inc. is at East 66 Midland Ave.

## GE's 'Map' Allows Economic Forecasting

NEW YORK — A time-sharing service from the corporate planning staff of GE allows users to tap an extensive data base for long-range planning and economic forecasting.

A supplementary service is said to provide users with some of the same data in printed form and through telephone consultation with GE staff members.

According to GE, the data base for the Management Analysis Projection (Map) system includes: economic statistics for some 850 key national indicators; financial summaries covering 60 areas of more than 900 industrial companies; and, statistics by industrial classification. It also includes historical and projected data of 3,000 major areas of business and commercial activity, and histories and forecasting of industry and the economy.

### Complete Model

With Map, GE said, the user will be able to set up a complete model of his business in relation to the economy, similar busi-

nesses, markets and regions. By adding statistics on prices, sales, earnings, market share and other key indicators, he can assess the effect of various possible business moves.

GE said that initially Map will be available only in the Northeast, based on a large-scale GE-600 series computer in Teaneck, N.J. A spokesman added that users are expected to be primarily from among the nation's top 500 companies, but GE also expects that educational, governmental, and research-oriented institutions will also find it useful.

Cost of the Map service is based on a series of charges, including CPU time, programs used, line charges and access fee, GE said. A "typical business firm" would pay a monthly charge of from \$200 to \$1000, depending upon usage, the company said.

Mapcast, the supplementary service, is offered nationwide. It consists of a 35- to 50-page review of economic prospects,

including a compilation and summary of more than 500 economic indices; telephone consultation with GE economists, available quarterly to coincide with publication of the review; and periodic newsletters.

Annual fee for Mapcast is \$375.

## Utility System Debugs Fortran Programs

EDISON, N.J. — Users of large-scale 360 and Univac 1108 systems can consider the Fortran Utility System (FUS) from Digital Solutions, Inc. for debugging, timing and checking out Fortran programs in either batch or time-sharing mode.

According to Digital, FUS is modular. The first part is the Fortran Automatic Debugging System (Fads) which Digital describes as a comprehensive symbolic display system. It offers programmers the ability to examine in detail the computational flow of Fortran source code at all desired points of

interest, the company said.

Designed to save CPU time and improved program efficiency, the Fortran Automatic Timing System (Fats) is said to display a complete CPU timing report of all desired subroutines.

The Fortran Automatic Check-out System (Facs) displays all source statements not used during a Fortran execution. Highlighting unused portions of the program in this way, Facs is used to insure thorough test cases and resultant reliable programs, the company said.

Operational now on 360/65, 75 and 85 in batch mode under

OS with 256 core, FUS is also available for the 360/67 for time-sharing operations. The company said that the system has also been implemented on the Univac 1108 under both Exec 2 and Exec 8, with core requirements comparable to those on the 360s.

The entire package is available for \$15,000, Digital said, or it can be leased for \$750/mo. The Fads module is for sale separately at \$10,000, or \$500/mo, while the Fats and Facs modules are priced at \$4,000 or \$200/mo.

Digital Solutions Inc. is at 100 Menlo Park.

## Decus Has PDP-11 Simulator, Assembler

MAYNARD, Mass. — A program to simulate the operation of the Digital Equipment Corp. PDP-11 small computer of

DEC's PDP-10 computer has been added to the Digital Equipment Computer Users Society (Decus) program library.

The simulator, SIM-11, will allow users who do not have a PDP-11 computer available to immediately create and debug routines for the system. SIM-11 programming could be utilized by users awaiting delivery of a PDP-11 or those with a shortage of processing time.

Decus claimed the simulator provides on-line debugging aids which may not be available when testing programs on the PDP-11 itself.

SIM-11, which is written in a combination of Fortran and Assembly Language, provides simulation of all PDP-11 instructions. Teletypewriter and paper-tape I/O capabilities, on-line debugging, program correction, and error detection can be simulated with SIM-11 on PDP-10 systems with a minimum of 15K storage.

Assembly Language programs for the PDP-11 may be processed in simulation on the PDP-10 by executing Decus' PALX-11 assembler. Decus said that this is a more efficient process than operating directly on the PDP-11.

SIM-11 tapes are available at no cost to Decus member firms (delegates). Non-Decus personnel will be charged \$1 for the binary tape version or \$5 for the source tape of the simulation program.

The Decus Program Library is at 146 Main St.

## Commercial Paper System May Cut Borrowing Costs

MILWAUKEE — Allis-Chalmers is offering through its Data Services Division a commercial paper system to reduce the borrowing costs of subscribers.

The program is designed for firms with a high volume and high turnover of borrowing for finance operations and could provide for substantial savings on interest payments and administrative costs.

Using the system, careful money management can be developed by regular monitoring of weighted costs of individual loans of equal face value but differing maturities; balancing cash positions between bank accounts, and locating idle cash to

reduce need for borrowing.

Cash requirements can be projected as rapidly as on a day-to-day basis permitting borrowing to be concentrated heavily on low-cost, unsecured one- to five-day notes, which can be administered rapidly at less cost than that for manual administration, the company said.

This system can be used with 360/30s, 360/40s, or 360/50s under either DOS or OS.

The cost to users is under \$20,000, varying according to details of requirements. Delivery schedule is 60 days after contract signing.

The address of Allis-Chalmers Manufacturing Co. is P.O. Box 512.

## GARBAGE

That's what your files will look like to unauthorized people.

Cipher/1 protects any type of confidential data.

A Mail Order Module for System/360  
Cobol, Fortran, PL/I  
Assembler; OS DOS/TOS

\$495



XANTHOS  
SOFTWARE INC.  
281 Main Street  
Wilmington, Mass. 01887  
(617) 657-7212



Photocomposition Computer

## Photocomposition Service Added to Metacomputer

IRVINE, Calif. — Publishers of catalogs, directories, parts lists, and other "volatile" text materials can use a computer-based photocomposition service available through Metacomputer Sciences Inc. (MSI)

The developer reportedly has combined the data-manipulation capabilities of the computer with one of the first operation models of the IBM 2680 CRT printer to produce camera-ready text pages that can be sent directly to the printer.

Sequence of entries and format of the printed output is under program control to meet the user's requirements, the company said. Unlike conventional computer-controlled printing units, the 2680 is said to provide a range of more than 250 type fonts and sizes. Page numbering

and headings are also provided if desired. MSI said, however, that the system cannot handle artwork.

Each page is composed on the CRT and the image is then transferred to paper, the company said. Unless artwork is to be added, the output can be used by a printer as the basis for offset reproduction, according to MSI.

The company said that cost of the service would depend on the individual user's needs. A spokesman said that he felt most users could save 25% to 30% over conventional costs. In addition, he said, the service provides significant savings in time compared to conventional typesetting techniques.

Metacomputer Sciences Inc. is at 17791 Sky Park Circle.

**For National EDP  
Coordinator**  
**Compu Search**  
1255 Euclid Avenue  
Cleveland, Ohio 44115

**A  
MANAGEMENT  
RECRUITERS  
INTERNATIONAL INC.  
Company**

Name \_\_\_\_\_

Street Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Home Phone No.: Area Code \_\_\_\_\_ No. \_\_\_\_\_

Current Position \_\_\_\_\_ Location Preference \_\_\_\_\_

Position Desired \_\_\_\_\_ Salary Desired \_\_\_\_\_

**THIS COUPON  
PLUGS YOU INTO  
THE NATION'S LARGEST  
EDP PLACEMENT NETWORK.**

Compu Search is a nationally coordinated network of over 50 offices devoted exclusively to your career advancement in the Data Processing Industry. We know our installations like a printout and have an abundance of positions at all levels of data processing. Salaries range from \$7,000 to \$40,000 per year, and naturally our client companies assume all fees.

Compu Search account executives know the EDP Industry. With Compu Search, your future is in the hands of professionals. Through a nationwide network of offices, your Compu Search men have at their fingertips the right position for you. (The coupon confidentially puts you in touch with well over 9,000 employers!)

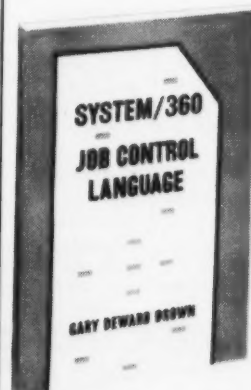
If you're not progressing rapidly enough in America's most rapidly progressing industry, return the coupon today. Better yet, send your resume with the coupon and save a step. After all, time is important.

So is getting started; send in the coupon and load your career program today!

**COMPU SEARCH**

A Management Recruiters International Inc.  
Company

1255 Euclid Avenue • Cleveland, Ohio 44115  
Your EDP Future is our only Business



## NEW from WILEY-INTERSCIENCE The first commercially published book on SYSTEM /360 Job Control Language SYSTEM/360 JOB CONTROL LANGUAGE

By Gary DeWard Brown, *The Rand Corporation*

This manual presumes no previous knowledge of System/360 JCL and is appropriate for those familiar with any computer language whether they code in COBOL, FORTRAN, PL/I, assembly language, RPG, or some other language. The manual serves as a learning text for the programmer who wants to understand and use System/360 Job Control Language, and as a reference for the experienced JCL programmer.

The brief index of Job Control Language parameters, the table of contents, and the index will quickly guide the reader to relevant portions of the text where various features of the language are clearly explained.

"Each Job Control Language feature is described in complete detail, examples are given for its use, and possible applications are discussed. Many System/360 facilities are also described in detail, with abundant examples given to show how they can be used through Job Control Language. These facilities include the linkage editor, indexed-sequential data sets, and several IBM-supplied utility programs."  
—from the Preface

**CONTENTS:** Job Control Language Parameters. Introduction to JCL and System/360. JCL within a Job. JCL Card Formats and Rules. Job Card Specification. Exec Card Specification. Parameters Common to Job and Exec Cards. DD Card Specification. Cataloged Procedures. DD Cards for Peripheral I/O Devices. Direct-Access Devices. Magnetic Tapes. The Linkage Editor. Miscellaneous JCL Features. Appendices. References. Index.

1970 292 pages \$7.95 paper

**WILEY-INTERSCIENCE**

a division of JOHN WILEY & SONS, Inc.  
605 Third Avenue, New York, N. Y. 10016

In Canada: 22 Worcester Road, Rexdale, Ontario

**wiley**



# Keytape.\*The long distance operator.

If you're looking for a high-speed, low-cost communications terminal, look what Honeywell has for you: the Keytape Communicator/Line Printer.

It can transmit data over ordinary telephone lines at up to 2400 bits per second. Double buffering and message blocking features pack more transmitted data into any given time interval.

It can print out hard copy at 300 lines per minute. At the same time.

And it's unusually reliable because of sophisticated error detection and recovery capabilities.

The Keytape Communicator/Line Printer can operate in an unattended mode, too. So it's ready for remote polling whenever your central computer is.

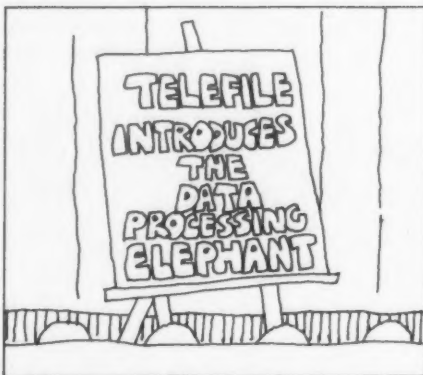
And in its spare time, the Communicator can act as a basic data preparation unit... recording and storing your source data directly onto computer-compatible magnetic tape.

Find out all the many other things the growing Keytape family can do for you. Call our local sales office. Ask the operator for the Operator.

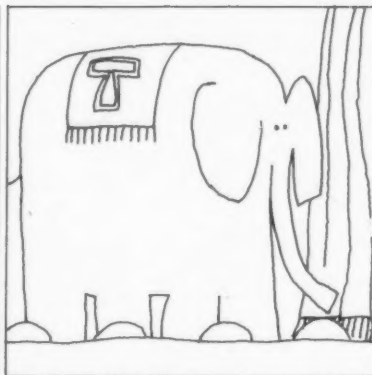
The Other Computer Company:  
**Honeywell**



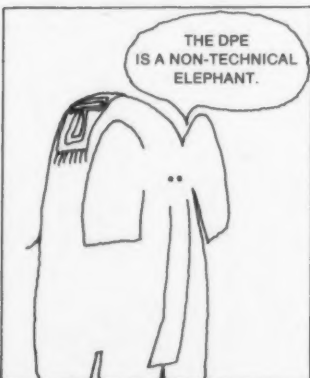
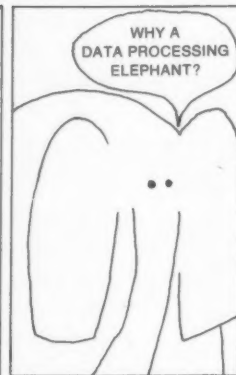
# The Data Processing Elephant



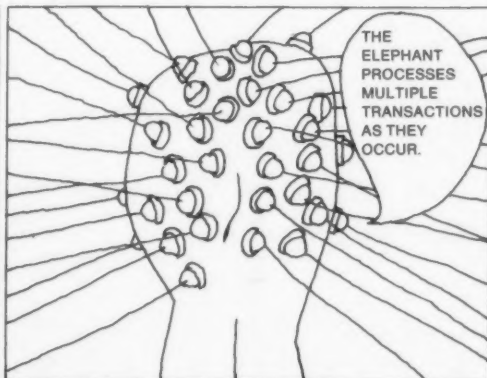
The Data Processing Elephant, or "DPE" as we call it, is a unique file management computer.



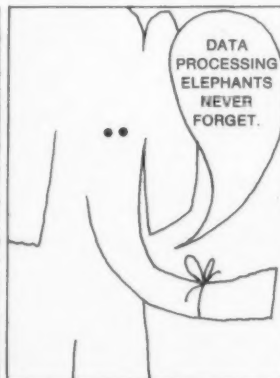
By itself the DPE can manage all your files or it can complement your present EDP system.



The DPE's language is a simple standard COBOL. The common business language. So you don't have to be a computer expert to use the DPE.



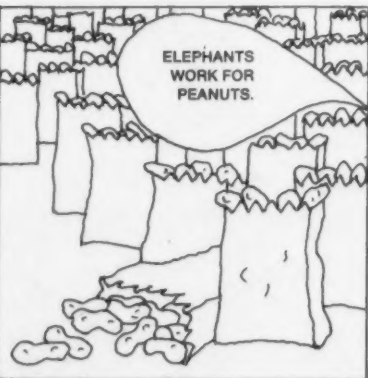
Telefile's DPE is the only on-line, real time, general purpose file management system.



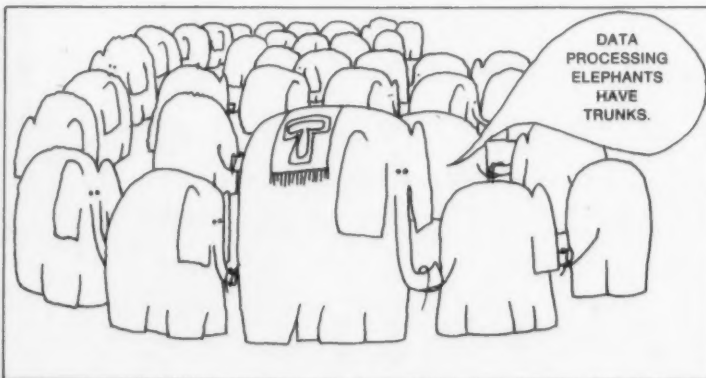
The DPE can lay its hands on any information you need right away. Because the DPE features random access and no sorting.



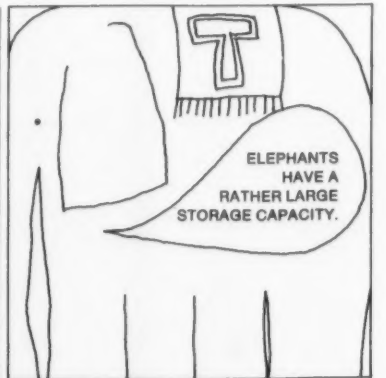
Telefile will help plan a DPE to fit your particular company's needs for data storage capacity and communication facilities.



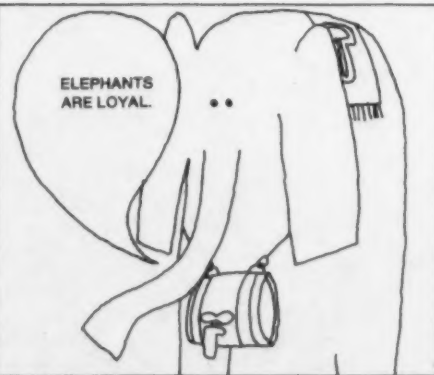
Many, many, many peanuts.



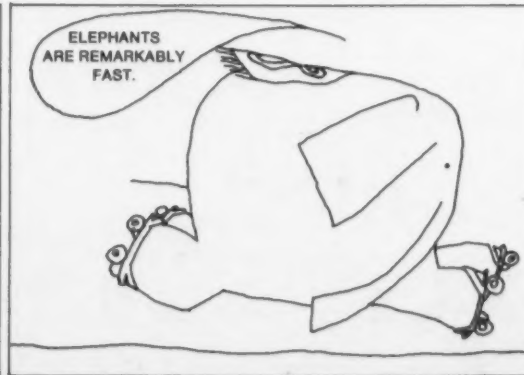
Up to 56 terminals can be linked to the DPE for a complete communications capability.



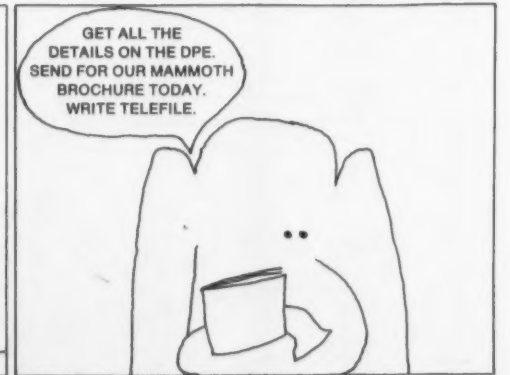
The DPE can store up to half a billion characters of information.



The DPE can be coded for security. Therefore nobody can get access to any part of the elephant's memory unless he's entitled to it.



You can retrieve any information from the DPE in a matter of seconds.



Telefile Computer Corporation  
2000 Commonwealth Avenue  
Auburndale, Mass. 02166

**Telefile**



## Multiple Data Sets Hold 18 Bell-Compatible Modems

PALO ALTO, Calif. — A series of multiple data sets in rack-mounted groups of Bell-compatible modems occupying only 7 inches of vertical space is offered by Vadac Corp. The equipment features a purchase price lower than one year's rental of competitive equipment,

### Communications

according to the company.

Designed for time-shared and remote terminal computer applications, the VA300M chassis holds up to 18 full duplex data sets (Bell-103-type) and an integral power supply in a standard equipment rack.

The VA300M is also available with 18 data sets for answer-only operation. The same chassis

can alternatively hold 16 data sets, a dialer and a dial line multiplexer for originate/answer systems.

The dialer is electrically equivalent to the Bell System 801 automatic calling unit, the company claimed. A dial line multiplexer shares the dialer among 16 modems and has an 8-bit address. One dialer can handle up to 256 separate lines, Vadac said. Binary, serial, and asynchronous data can be handled by the VA300M sets at rates of 0 to 300 bit/sec, full duplex.

The average price of one of the 18 or 16 units is \$200. The chassis and power supply costs \$1,000. The dialer and multiplexer for the 16 data set originate/answer system costs \$350 each.

The delivery schedule is 60 to 90 days.

Vadac Corp. is at 916 Commercial.

## FCC Sets June Deadline For Carrier Comments

WASHINGTON, D.C. — The Federal Communications Commission has extended the time limit for the filing of comments on the commission's tentative ruling concerning the interdependence of communications services and facilities [CW, April 8, 15]. The new deadline for comments is June 15.

The extension, from the previous deadline of May 13, was granted at the request of Western Union since the company said it "will be substantially affected" by the proposed decision and its comments "will require an in-depth analysis of the complex issues involved."

Under the commission's tenta-

tive ruling, non-common carriers providing data processing services would not come under FCC regulation and regulated carriers with operating revenues of \$1 million or more would be allowed to provide data processing services only through completely separate corporations.

In addition to common carriers such as AT&T and Western Union, non-carrier groups such as the Association of Data Processing Service Organizations, Inc. (Adapso) are also known to be preparing position papers concerning the tentative ruling. The FCC has said it will consider comments from all interested parties.

## Western Union Data Services Unit To Give Users Terminals, Systems

HOUSTON — A data services subsidiary that would provide data terminals and information systems for communications users was announced by Western Union officials here at the annual meeting of the International Communications Association (ICA).

The new firm, Data Services Co., to be based in Fort Lauderdale, Fla., will design, sell, and lease components to allow communications users to make maximum use of message and data communications facilities, according to Z.V. Zakarian, Western Union vice-president who will head the new company.

Zakarian told ICA members that the initial product of Data Services will be a line of teleprinters designed for use as terminal components. He added that although the first products will consist of currently available equipment, "a new generation of terminals and electronic data communications systems..." is being planned.

Western Union also recently formed International Data Ter-

minals Inc., to develop a line of data terminal equipment.

### German EDP Link Up

FRANKFURT — The leading West German electrical groups, Siemens and AEG-Telefunken, are to begin talks with a view to closer co-operation in the EDP field.

The talks would be aimed at avoiding parallel developments and double expenditure on investment. If the talks go well, the two groups will set up a joint subsidiary to produce large computers.

### Correction

The American Information Exchange, a network being planned to handle business messages for subscribing data users [CW, May 13], is a wholly owned subsidiary of Financial Technology Inc., 7501 Carpenter Freeway, Dallas, Texas.

Peripheral Technology Inc. manufactures computer-related equipment and has no connection with either the AIE or Financial Technology Inc.

## INTERNATIONAL DATA CORPORATION

is pleased to announce that

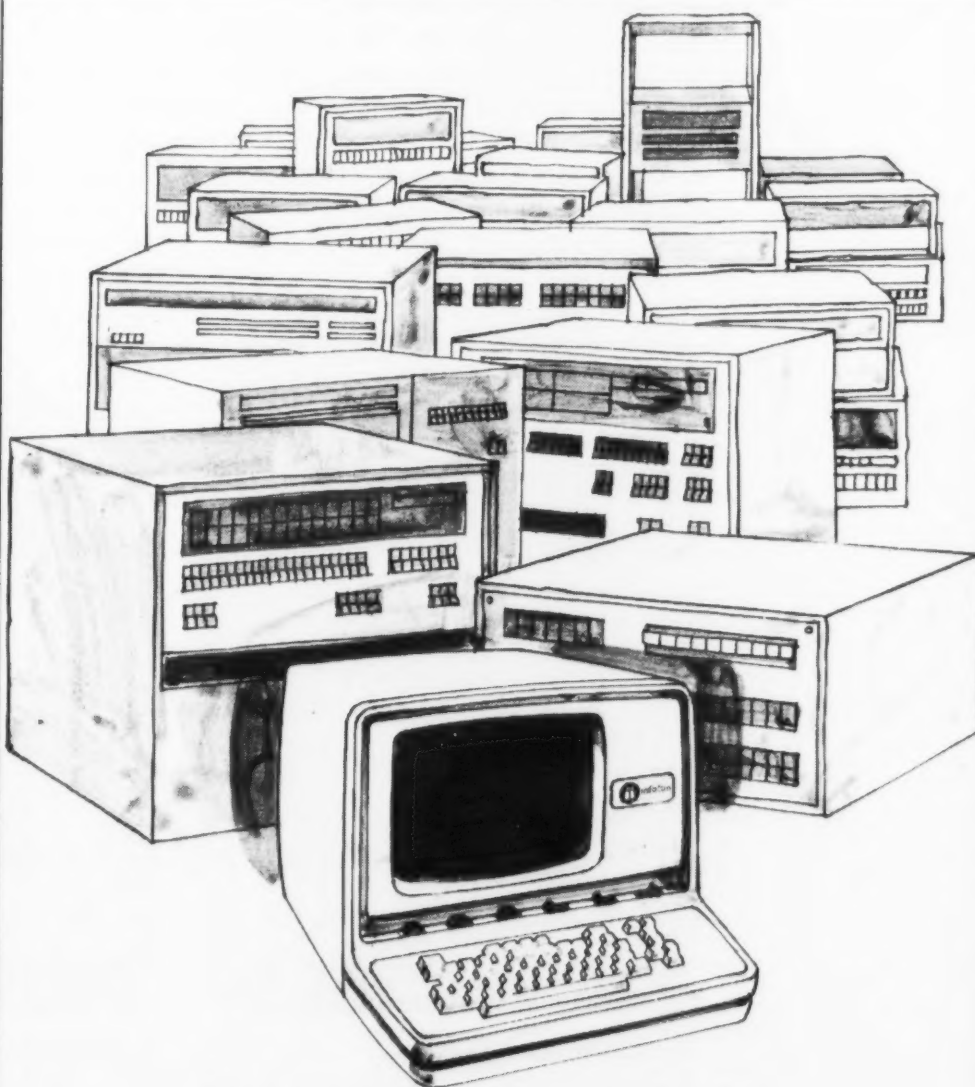
**C. OAKLEY MERTZ**

Manager, EDP Industry Planning Service



International Data Corporation  
60 Austin Street  
Newtonville, Massachusetts 02160

IDC is the largest market data gathering, research, and consulting firm in the computer industry.



## Fussy, she ain't.

Vista makes it big with any mini-computer.

Vista is an alphanumeric display terminal that's fast, silent, easy to read. Far more efficient than her ancestor, the KSR-33 teletype. And completely compatible with whatever mini-computer you're using.

A completely self-contained, stand alone unit, Vista comes with keyboard, video presentation, control and refresh electronics, data phone interface and power supply. All keyboard operations, including cursor movement, are transmitted and received permitting software editing. Standard interfaces connect to modems up to 1800 baud. Parallel and current loop interfaces are available as options. Vista is available for immediate delivery, for as little as \$1495.00. For further details, write for our free brochure or call.



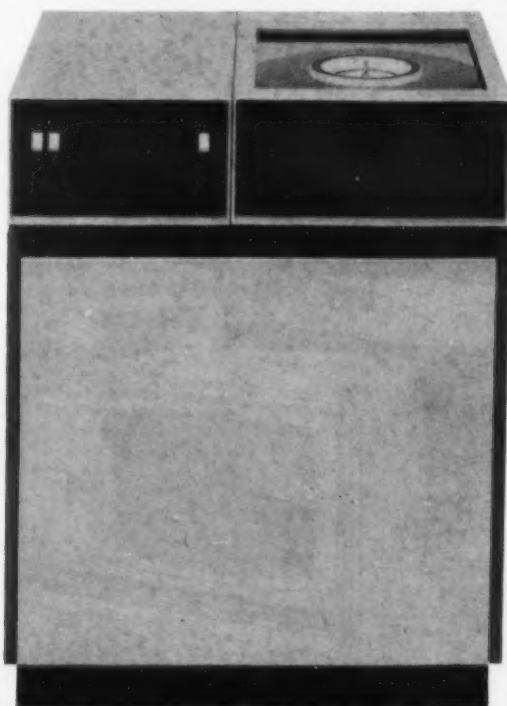
**Infoton**

Infoton Incorporated, Second Avenue, Burlington, Massachusetts 01803 (617) 272-6660  
560 San Antonio Road, Palo Alto, California 94306 (415) 493-0615

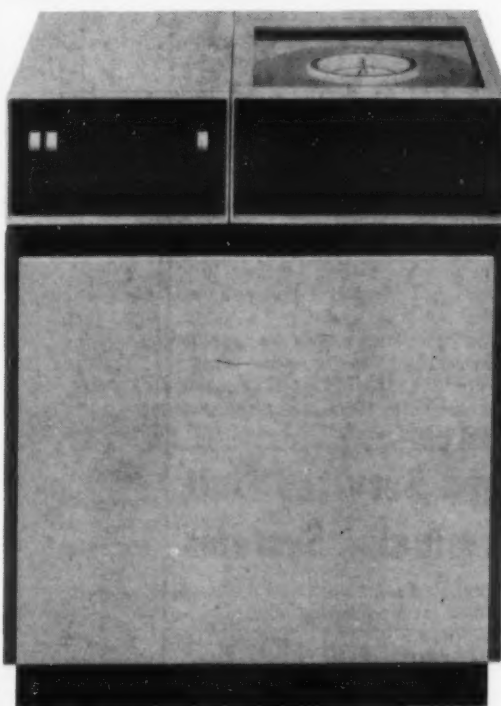
# Economy Drive

The Memorex 620 attaches right to your 360, model 20. The 630 attaches to your 2841 controller or System 360/25. Both offer total hardware and software compatibility. Both provide up to 40% savings under our lease/maintenance plan. And both are available for immediate delivery.

Memorex can now fill the disc storage needs of any 360 user. And if you wonder why we're the largest independent marketer of disc drives, just compare our quality and prices with any other drives on the market. Then write: Memorex/Equipment Group, San Tomas at Central Expressway, Santa Clara, California 95052.



The Memorex 620



The Memorex 630

**MEMOREX**



# COMPUTERWORLD

## DP Accessories Supplement

May 27, 1970

Supplement/1

### **Security—Not Provided Through Accessories**

*A look at data security, the products available, and the high costs of conventional techniques. What ways can be found to avoid these problems? . . . . . Page S/6.*

### **DP Accessory Firms Listed**

*Computerworld compiles a partial listing of data processing accessory firms. What kind of products do they make: where are they? . . . . . Page S/7-13.*

### **Users Pick Disks, Forms, Tape Vendors**

*A survey of Computerworld readers to determine their opinions of their accessories' suppliers. Who are the best? How are they rated? How much are users spending on accessories, tapes, disks, forms? . . . . . Page S/14.*

### **Lack of Tape Certification User Problem**

*Magnetic tape certification — a major argument over whether tape should or should not be certified. What difference does it make? How much does it cost, and how much does it save the user? . . . . . Page S/15.*

### **High Density Disks to Tighten Tolerances**

*A new technology is growing in the disk industry. What impact will it have on existing installations? What changes in disks themselves will be necessary? . . . . . Page S/17.*

### **User Accessory Needs Change**

*What are the changes taking place in the accessories business? What causes the types of available accessories to change? What particular product areas are reflecting these changes now? . . . . . Page S/19.*

A limited number of additional copies of this supplement are available at 20 cents each. CW pays postage on Prepaid orders. Send requests to: Circulation Manager, Computerworld, 797 Washington St., Newton, Mass. 02160.



"Scotch" Brand 700

# Black Watch



# The computer tape that guards itself.

## It protects your valuable data.



Now, 3M takes the next step in computer tape. An exclusive new textured backing gives Black Watch a built-in resistance to physical damage in shipping, storage and handling.

Cinching and edge damage are dramatically reduced.



If the tape shifts, due to temperature change or improper wind tension, the textured backing permits the roll to regain its normal configuration without permanent damage or loss of data.

A new resistance to scratches on the backing helps prevent the redeposit of dropout-causing polyester chips and effectively extends tape life.

Where conventional tape was severely scratched after 500 passes, Black Watch showed no significant wear after 2000 passes on the same tape drive.

New protection against dust and airborne contaminants is built in, too. The conductivity of the textured tape backing reduces static attraction of dust and dirt particles. In addition, increased tape compressibility minimizes distortion and damage caused by wound-in debris.

Lower tape skew (a diagonal passage across record heads) means fewer interchangeability problems and fewer reruns.



Want to call out the guard? Ask your 3M representative or write Market Services, Magnetic Products Division, 3M Center, St. Paul, Minn. 55101. Find out how "Scotch" Brand 700 Black Watch computer tape can protect you against loss of time and money.

"SCOTCH" IS A REGISTERED TRADEMARK OF 3M CO.

**3M** COMPANY The barrier breakers.

## Problems Too Specialized?

# How Adequate Are Accessories for Project Control?

Project control is one area in which companies have attempted to provide users with accessories to help in either planning or scheduling maintenance.

According to several users, most of this equipment is totally inadequate because it cannot cope with the scope of specialized problems surrounding any major system design.

Pert charting, a technique of identifying the path in which things must be accomplished in order to get the job done on time and with minimal waiting, gives the user a chance to find out what things have to be done first.

This type of scheduling allows for very little flexibility, except when run on a computer. If one person's schedule slips, a complete reevaluation of the overall schedule is needed to maintain the necessary sequence. If a given task is not

completed in the needed time, how much slippage must be allowed for every task dependent on the slipped one?

A pert chart, as an accessory, comes as a magnetic or adhesive wall chart with little blocks to signify completion points and to identify tasks. It is not sufficient to merely move these blocks around to indicate schedule changes. All the calculations have to be remade to find the new "break-points." A computer output is generally far more useful, since it simply requires another computer run to re-define the schedule points.

### Gant Chart

The Gant chart, a technique for measuring completion times against projected times and estimating the performance of an employee, lets the user keep records of slippages and changes in deadlines. It does

not provide any integrated picture of slippage or advance deadlines, but it does identify the particular employee who is missing his deadlines consistently or who is consistently ahead of schedule.

Few companies have produced wall boards for this function, though it is far more suitable for display and permanent mounting than a Pert chart. A magnetic board with sliding indicators working horizontally to indicate deadlines is the only equipment needed.

Magnetic flowcharting is considered mainly as a more complex way to accomplish an already complex task. It requires drawing a flowchart to describe systems that are frequently not describable in two dimensions and are also frequently changed or altered to reflect new designs.

Flowcharting itself is rapidly becoming popular with installations that have never tried to document thoroughly. It is a tremendous improvement over non-documented programs. However, installations that have been using flowcharts for several years are now trying alternative methods. Flowcharting is too costly in time and manpower, unless it can be done directly from the source program via computer.

### Decision Tables

Some alternative methods involve using decision tables to specify the order in which groups of instructions should be executed. With decision tables, the program becomes self-documenting. The decision points are described beside the source coding and can be read by anyone whether or not they are familiar with programming methods or coding.

Particularly with natural languages like Cobol, decision tables are much more easily maintained and described. With some modern decision table compilers, the decision tables are all that the programmer needs to code. The compiler translates the decision steps into Cobol code automatically while providing complete logic documentation for the executing program.

For scientific languages, flowcharting is both simpler and more universally used. The nature of a flowchart is more suited to the nature of a mathematical or engineering problem where the steps occur in a logical sequence having some relationship to the problem being solved. Frequently, business programs have a logic that is totally arbitrary, based on the nature of the data rather than the nature of the problem.

Some languages, like Adpac and Mark IV, are truly self-documenting. The way the language is designed, a small familiarity with the language allows anyone to decode what is being done and in what order. Both of these languages contain the implicit functions of decision tables, but these decision tables are "transparent" to the user. The logic of the function is predefined by the language. All the programmer needs to do is fill in the blanks around the logical structure.

As more and more languages are available and programming problems are stated in more specialized or self-documenting languages, there will be less and less need for flowcharting. The types of documentation expected to replace flowcharting, like the decision table, are very suitable to charting or display.

Though no known product exists to display decision tables, it would require very little to produce such a product, and its use probably will become very widespread over the next few years.

## A dirty tape can put a computer down.

Depressing. Dirty tape causes data dropouts. And dropouts cost you money. That's a bad scene.

RCA Computer Tape helps keep computers up.

It's a special formulation that

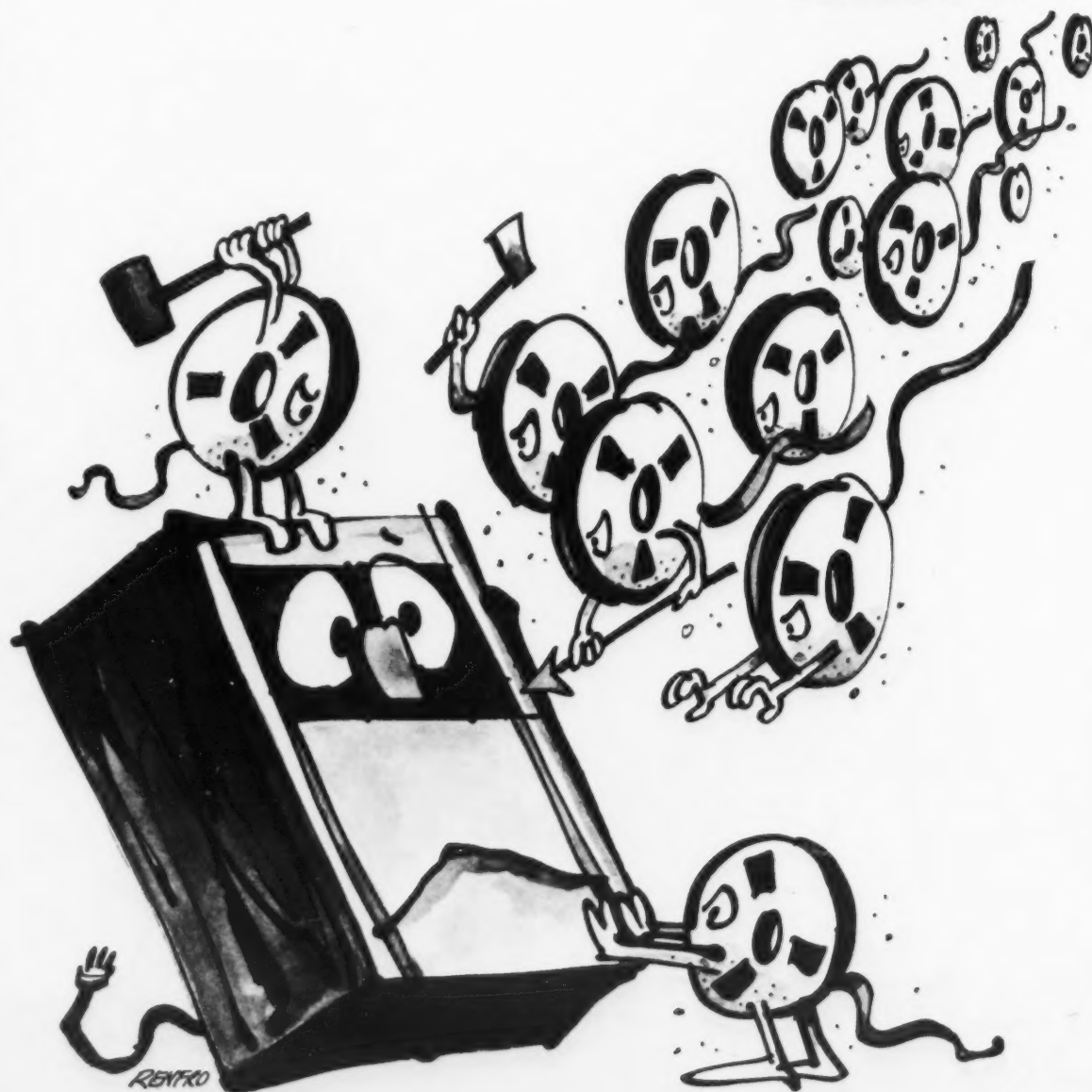
starts cleaner. Every inch of every reel is tested and certified in the cleanest of white-room conditions. (No statistical testing for us.) And it stays cleaner, longer.

Result? Fewer dropouts, more

efficient computing.

Show your computer what a good scene really is. Write RCA Magnetic Products, 201 E. 50th St., New York 10022. Our tape makes it.

**RCA** Computer Tape



"Let's Start a Franchise on This — That's the Way to Really Get in the Bucks."



## 'Categories' Game

## Products Explosion Creates New Classifications Need

By Christine Magnuson  
CW Staff Writer

With the increasing amount of new products and new product information flowing into *Computerworld*, CW has recognized the need to differentiate between categories of products.

The original split, between hardware and software, has been further broken down into systems and peripherals, software, and now data processing accessories.

Accessories are defined as a type of new product that is not directly operational with a computer as a device, but as a related product. This new category includes magnetic tape and disks, all forms of supplies, and special products to help people work with computers.

Sometimes there is a fine distinction between a peripheral and a new product. New products also go as far from directly related products as to include Cobol reference guides and hexadecimal adding machines.

## Basic Categories

The first basic subcategory within data processing accessories is storage equipment.

Paper tape storage, card trays, printout racks, disk pack cabinets, tape cabinets, filing systems, microfilm storage, and various forms of handling equipment are all storage equipment.

Many such products are standard items, like card trays and tape cabinets. Recently, companies have been developing products like paper tape winders, card storage devices designed to handle the new System/3 96-column cards, and microfilm.

The System/3 presented the first real

change in the kinds of punched-card storage equipment needed. Within weeks of this announcement, many firms were announcing card trays, card files, handling racks, sorting racks, desks with built-in storage, and everything else that might be needed to use the new cards.

Madison Avenue is focusing on this kind of accessory, with fancier names, more glamorous advertising, and more gaudy appearances.

## Storage Mediums

Related to storage, the largest category in the accessories section is storage mediums typified by tape and disk packs.

Tape has been mundane for several years, until companies recently began using cartridges of various sizes and types. These cartridges, according to users, have presented a serious storage problem. The sizes vary, the need for accessibility is much higher than for standard 2,400-ft reels of tape, and they have to be located at remote stations. The idea of a cartridge library is alien to the way tape cartridges are used.

In the disk area, there are now three principal types and sizes of disks. The standard 6-high pack has been replaced in part by the 11-high 2314-compatible pack, and by the single-platter disks used for the IBM 1130. Each of these disks represents an entirely different storage problem.

The disk packs are also unsuited for library storage. By nature, they are used for many different jobs in rapid sequence and are constantly being switched from one system to another. Thus the disks must be stored near the related machines, not in a separate room. Some disk applica-

tions, such as data bases, require that the disk be on-line most of the day, and then stored at night for protection.

Disk storage is more difficult than tape storage, because the disk packs are far less compact, are far heavier, and require more frequent handling.

As newer, high-density disks are developed, users are expected to have to develop better storage methods to prevent unnecessary contamination of disks from ordinary room air and smog.

## Pure Accessories

Accessory equipment, used the same way the automobile companies use the word accessories, are devices that are not essential to the running or direct operation of the equipment. Frequently, however, such equipment is necessary for the operation, by human beings, of computer equipment.

This is the case with such equipment as tape certifiers, paper tape handling and winding equipment, card sorting and storage equipment, and forms storage.

True, the user could lay his cards around in piles, his printouts in heaps, and his tapes in bundles in the computer room. However, there is a high likelihood that such operational techniques would quickly lead the user to a catastrophe. It is no longer a question of improving efficiency. In order to get anything at all done, it requires that the user organize his computer facility around the work being done and the people doing it.

## Environmental Control

Environmental control has been the area where equipment and people needs have overlapped. The equipment must have its

environment maintained at a constant and fairly low humidity. The people, who are frequently under stress, rushed, and confused, must also have their environment controlled unless chaos is to result.

Many firms are now engineering the computer environment through a consideration of the kind of foot traffic, the kinds of work being done by people, and the need to prevent these people from becoming frustrated and functioning erratically. People, just like machines, will malfunction if the environment is not well suited. Temperature changes, inadequate lighting, poor air, poor water, poor anything will cause small malfunctions. These little things add up to tremendous dissatisfaction with the environment and the type of work. The dissatisfaction produces frustration and frustration produces "mistakes" and personnel turnover.

## Expected Developments

As more optical and film equipment is used in data processing, complete new lines of data processing accessories will be produced. These accessories might include document feeders for OCR equipment, film storage cabinets or microfiche storage trays for file access, vacuum cleaners to maintain a low dust level around optical equipment, conveyor system to smooth the flow of paper and film around data input and output stations.

## Traffic by Computer

HAMBURG — Hamburg is to be the first city in the country to introduce EDP for its bus network. Computerized supervision will end jams and convoys as far as possible.



"For Relaxation From the Button Pushing —"



"We're Desperate for Help — But Mind You, No Little Green Men or Such..."

## COMPUTERWORLD 1970

Announces A  
Special Report in the  
July 1st Issue

## "Communications and Terminals"

This Special Supplement will be devoted to the fast growing Terminal market of the Industry.

If you have products and services devoted to this Communications and Terminal market, this Supplement is your opportunity to advertise in an exclusive environment.

Issue Date — July 1st

ADVERTISING FORMS CLOSING:

Black and White or Color — June 12th

For more information, contact the COMPUTERWORLD Sales Office nearest you.

National Sales Manager  
Neal Wilder  
Sales Administrator:  
Dorothy Travis  
COMPUTERWORLD  
797 Washington Street  
Newton, Mass. 02160  
(617) 332-5606

New England Regional Manager  
Robert Ziegel  
COMPUTERWORLD  
797 Washington Street  
Newton, Mass. 02160  
(617) 332-5606

Midwest Regional Manager  
Bill Farrell  
Eastern Midwest District Manager  
Joe Daniels  
COMPUTERWORLD  
Suite 218  
25 East Chestnut  
Chicago, Illinois 60611  
(312) 944-5885

Mid. Atlantic Regional Manager  
Donald E. Fagan  
Phila. — Wash., D.C. District Manager  
John Cummings  
COMPUTERWORLD  
Suite 4C  
120 East 34th Street  
New York, N.Y. 10016  
(212) 532-1790

South East Regional Manager  
Ed Graham  
Stemmons Tower West  
2730 Stemmons Freeway  
Dallas, Texas 75207  
(214) 638-1140

Los Angeles Area:  
Bob Byrne  
Gherwood/Byrne/Clarkson  
and Associates  
1017 N. LaCienaga Blvd.  
Los Angeles, Calif. 90069  
(213) 657-6221

Japan:  
Mr. Naoyoshi Ando  
Fuji Corporation  
3-1, 5-Chome Yoyogi  
Shibuya-Ku  
Tokyo, Japan

San Francisco Area:  
Bill Healey  
Thompson/Healey Assoc.  
1111 Hearst Bldg.  
San Francisco, Calif. 94103  
(415) 362-8547

## Adaptational Equipment Used

# More Work Needed to Solve Problem of Data Security

By Peter L. Briggs

CW Supplement Editor

Several specialized products are designed for installations where data security is of prime importance. Among these are paper shredders, security alarms, special tape and disk cases, and various types of secure files.

Those seeking this type of systematic protection are government-contract oriented sites and financial operations like the exchanges and brokerage houses. Other companies may keep their data secure at will, but most find the cost prohibitive.

The whole problem of data security is only beginning to have an impact on the business user. More and more of the users with large computers are putting company financial, marketing, and planning data on computer systems. These companies will soon discover that one of the most portable types of important material is data.

### Industrial Espionage

When data is condensed into computerized forms, it becomes even more portable. Industrial espionage, long a significant factor in competitive markets

like automobiles, banking, consumer products, and the clothing and technology-oriented industries, is both well paid and worthwhile for companies investing large sums in new product lines.

Even the computer industry [May 20, CW] suffers from various types of espionage. Various manufacturers try to keep current on what the competition is doing in order to improve their own products and better their penetration of a particular part of the user base.

Though the problem has been around for many years in the military and government areas, proper security has never been adequately provided without enormous inconvenience to those under it.

This inconvenience makes the cost very high, severely slows down the rate at which things are accomplished, and prevents the most advantageous use of secured data. The barriers that have to be built around information to secure it properly are such that the data becomes nearly unusable.

This paradox has caused scientists in the government and re-

searchers in technology and industry to revolt.

With the use of computers to solve the security problem surrounding computers, it might be possible for users to find secure means of storing and handling data that do not present all the problems traditional security systems impose.

The kind of equipment being built to help solve this problem now is merely an adaptation of traditional security methods.

It might be true that the security problem can be presented as an algorithm and solved by computer. Of course, if a computer can prepare a solution, another computer with the same data can also break down the solution. Computer analysis is being used frequently to crack ciphers and encoded communications. It is also the method used to scramble telephone calls. An analog codes the data, and a matched data analog decodes at the receiving end.

### Insignificant Data

Conceptually, the only solution is to make the data appear of no significance. This is rela-

tively easy with computers. If an output report is presented without headlines and without apparent organization, it becomes very difficult to translate the contents into meaningful information. By using a simple overlay, however, the data becomes immediately clear and understandable.

This is only a simple solution to a very complex problem, but one that eliminates many disadvantages of printed output without increasing the difficulty of use beyond reason.

This technique has been used successfully in several applications where large bases of data are displayed and where it is desired that many people have access to the data, but only in parts or segments.

Much more work is required to obviate the need for such protections, and most of this work will probably remain undone until after it is too late. There will, according to many people in the industry, be a significant growth in the business of information stealing over the next few years.



"I Set It to Turning Out Its Own Statistical Charts. Now I Can't Find the Off Button."



"Yes . . . s . . . s, It Does Use Considerable Paper . . ."



## WE HAVE WAYS OF MAKING YOUR COMPUTER TELL THE TRUTH.

We simply make your tape tell the truth. By eliminating unpleasant and annoying errors and signal loss. Caused by iron oxide debris, dust, dirt and physical mishandling.

Our method is the Kybe Tape Maintenance system. It's a most thorough way of cleaning, testing and certifying tape. Which is why 70% of the people who maintain tape, rely on Kybe.

First, you put preprinted Kybe labels on each reel of tape. These labels have empty check boxes in rows and a simple accounting system for tape control. Each time you make a pass on the computer, you check an empty box. When you fill a row, clean the tape. When all the boxes are checked, it's time to test and maybe recertify the tape.

Kybe can sell you the equipment to do the whole job in-house. Or, if you like, you can send the tape to a Kybe service center and we'll take care of it.

Either way, your computer will tell the truth and enjoy doing so.



**KYBE CORPORATION**

132 Calvary Street, Waltham, Mass. 02154  
Telephone (617) 899-0012  
Offices & representatives worldwide



# DP Accessories Firms

Computerworld has surveyed users, trying to identify as many companies in the accessories business as possible. This directory is by no means complete, and CW will be interested in comments from firms whose names are absent from the list, to be considered for future updates.

**Acco**  
5150 N. Northwest Hwy.  
Chicago, Ill. 60690  
\* \* \*

**Acme Datagraphic**  
45 East Wesley St.  
South Hackensack, N.J.  
— Products: paper forms, inventory sheets  
\* \* \*

**Addo X**  
437 Madison Ave.  
New York, N.Y. 10022  
\* \* \*

**Allison Coupon Co.**  
Indianapolis, Ind.  
— Products: coupons  
\* \* \*

**Alpha Data Inc.**  
19005 Ventura Blvd.  
Tarzana, Calif. 91356  
— Products: magnetic disk, memories systems  
\* \* \*

**American Auto-Typist**  
2317 N. Pulaski Road  
Chicago, Ill. 60639  
— Products: keyboard testing unit, punched tape, readers, printers  
\* \* \*

**Ampex Corp.**  
Redwood City, Calif.  
— Products: precision digital cassettes, magnetic tape  
\* \* \*

**Apollo Computer Rm. Instrs.**  
P.O. Box 132  
Bellmore, N.Y. 11710  
— Products: air conditioning unit, raised flooring, office partition  
\* \* \*

**D. Armstrong Co. Inc.**  
3941 Fairhill  
Houston, Texas  
— Products: coding forms  
\* \* \*

**Arvey Corp.**  
3500 North Kimball Ave.  
Chicago, Ill. 60618  
— Products: paper tape, magnetic tape  
\* \* \*

**Audev-Audio Devices**  
New York, N.Y.  
— Products: reels and cases, computer tape  
\* \* \*

**Avery Label Co.**  
Monrovia, Calif.  
— Products: labeling machine, labels  
\* \* \*

**Bankers Box Co.**  
2607 N. 25th Ave.  
Franklin Park, Ill. 60131  
— Products: storage boxes for forms, cards  
\* \* \*

**BASF**  
Crosby Drive  
Bedford, Mass.  
— Products: disk, tapes  
\* \* \*

**Bell & Howell**  
CECI Data Inst. Division  
Pasadena, Calif. 91109  
— Products: magnetic tape, analog readout devices  
\* \* \*

**Bonnar-Vawter Inc.**  
96 Dunbar St.  
Keene, N.H. 03431  
— Products: paper tape reader, modem  
\* \* \*

**Boorum & Pease**  
84 Hudson Ave.  
Brooklyn, N.Y. 11201  
— Products: house devices for printout, housing for film, storage equipment for film binders  
\* \* \*

**Burroughs Corp.**  
2nd Ave. at Burrough  
Detroit, Mich. 48232  
— Products: forms, magnetic tape, disks, environmental  
\* \* \*

**W. H. Brady Co.**  
3333 B W Camron Ave.  
Milwaukee, Wisc. 53201  
— Products: pressure sensitive labels, pressure sensitive tab label sheets on pin-feed fan-folded continuous liners  
\* \* \*

**Caelus Memories**  
1376 N. 4th St.  
San Jose, Calif.  
— Products: disk packs, disk drives, memories  
\* \* \*

**Carroll Graphics Inc.**  
1515 North Harlem Ave.  
Oak Park, Ill. 60302  
— Products: dial cards, plastic cards, portable on-sight coding devices, cabinets for housing, encoders and interpreters  
\* \* \*

**Chase-Foster**  
P.O. Box 4305  
East Providence, R.I.  
— Products: laminated numerical control tapes  
\* \* \*

**Cheshire**  
Mundelein, Ill.  
— Products: labeling machine  
\* \* \*

**Chrono-Log Corp.**  
2583 West Chester Pike  
Broomall, Pa.  
\* \* \*

— Products: programmable clocks  
\* \* \*

**Cincinnati Time Recorder**  
1806 Central Ave.  
Cincinnati, Ohio  
\* \* \*

— Products: scanner, time clocks  
\* \* \*

**Computer Access Systems**  
Phoenix, Ariz.  
— Products: digital cassette recorder  
\* \* \*

**Computer Accessories**  
211 New York Ave.  
Huntington, N.Y. 11743  
— Products: splicers, tape punchers, rewinders, tape handling (tape peripherals)  
\* \* \*

(Continued on Page S/8)



**HANG IT ALL!**

THE 500 LARGEST INDUSTRIALS AS REPORTED IN THE OC

RANK	COMPANY	SALES \$000	%
1	GENERAL MOTORS	20,208,505	179.3
2	FORD MOTOR	12,240,048	62.1
3	STANDARD OIL (N.J.)	12,191,405	109.0
4	GENERAL ELECTRIC	7,177,256	33.8
5	CHRYSLER	5,649,505	18.9

**All your printouts, that is! In Wilson Jones HANGER Binders with built-in retractable hangers. In your dealers' stock...Ready to deliver**

Now! The fastest, most convenient method of binding EDP printouts for suspension filing systems: Wilson Jones Nylon Post Hanger Binders.

**EASY TO LOAD**—Bind "tab" sheets exactly the same way as in all other WJ Nylon Post Binders.

**EASY TO USE**—Just extend the slide hangers for suspension; push them in, out of the way, during reference on desk or counter tops.

**AND THERE'S NOTHING TO ADD...NO EXTRA HANGERS NEEDED...NOTHING MORE TO BUY!**

Wilson Jones Nylon Post Hanger Binders speed retrieval, reference, and re-filing. Designed for top and bottom loading of 14 1/8" x 11" (or smaller) unburst marginal-punched sheets, they can be hung in Wilson Jones "Data-Racks," "Data-Centers," and "Data-Stations," as well as other suspension housing equipment.

GET THE HANG OF IT TODAY...Immediate delivery from your Office Products or Data Processing Supplies Dealer. Or write for full information.

**NOW IN 6 COLORS FOR CODING REPORTS**



**WILSON JONES**  
Inventor of the Nylon Post Binder



A Division of *Swingline, Inc.*  
6150 TOLBY AVENUE · CHICAGO 60648

## DP Accessories Firms

(Continued from Page S/7)

### Computer Hardware Consultants & Services

1409 Easton Road  
Warrington, Pa. 18976

— Products: services moving and installing equipment

### Computer Link Corp.

14 Cambridge St.  
Burlington, Mass. 01803  
— Products: magnetic tape, cleaners & evaluators (tape maintenance)

### Computer Preparations

112 S. Dean St.  
Englewood, N.J. 07631  
— Products: room control floors, partitions

### Computer Ribbons Services

11813-1/2 East Slauson Ave.

Sante Fe Springs, Calif. 90670

— Products: reinkers of computer ribbons

### Continental Dataforms

Chicago, Ill.  
— Products: distributor of computer forms

### Control Data Corp.

8100 34th Ave.  
South Minneapolis, Minn.

— Products: forms, magnetic tape, disks, environmental

### Cummins-Chicago

Chicago Area  
— Products: scanners, text signers, readers

### Curtis 1000

Box 28154

Atlanta, Ga.

— Products: paper products

### Cycle Equipment Co.

Los Gatos, Calif.

— Products: punch tape paneling equipment

### Data Devices Inc.

18666 Topham  
Tarzana, Calif. 91356

— Products: computer ribbons, computer tape cleaner, portable card punch, tape certifier

### Data Mark

14251 Industrial Ave.  
Cleveland, Ohio 44137

— Products: pressure sensitive

### labels for data processing

— Products: computer reels, reel cases, wrap around collars, cartridges, cassettes

### Data Pax

New York Area  
— Products: disks, disk packs

### Dennison Data Processing

Framingham, Mass.

— Products: tabulating labels, paper products

### Donald Inc.

Box 104  
Ridgewood, N.J.

### — Products: tape splicers, tape punch

— Products: small handling equipment, filing supplies for punch tape

### DuPont Co.

Wilmington, Del. 19898

— Products: raw material paint, conductive metals

### Electric Wastebasket

New York, N.Y.

— Products: input electric wastebaskets, mail inserters, collaters, bailers, joggers, (paper movers)

### Ellingsworth Mfg. Co.

200 S. Peoria St.  
Chicago, Ill. 60607

— Products: binders for data processing sheets

### Engineered Data Products

930 E. Drayton Ave.  
Earndale, Mich. 48220

— Products: storage equipment — disk pack storage, plastic seal for computer tape

### Ennis Business Forms

Birmingham, Ala.

— Products: forms

### Exide Power Systems Div.

Box 5723  
Philadelphia, Pa. 19120

— Products: back-up systems if power fails, contained power

### Extex Microsystems

15424 Carbrito Road  
Van Nuys, Calif. 91406

— Products: microfilm duplicators

### Facit-Odheer Inc.

501 Winsor Drive  
Secaucus, N.J. 07094

— Products: key-to-tape devices, off-line entry devices

### Floating Floors Inc.

5400 N. Detroit Ave  
Toledo, Ohio 43612

— Products: raised floors, environmental systems

### P.G. Goret

60 Union Ave.  
Sudbury, Mass. 01776

— Products: magnetic tape cleaner

### Forms Inc.

Willow Grove, Pa. 19090

— Products: process color OCR scanwork, continuous tabulating cards, continuous forms

### Frye Mfg. Co.

Box 854  
Des Moines, Iowa 50304

— Products: paper suppliers for printout optical scanning

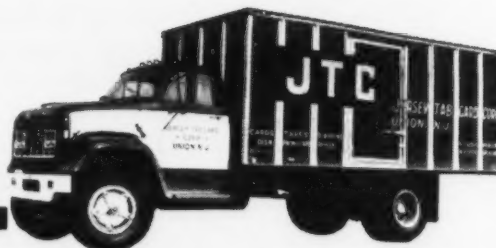
### GAF Corp.

40 High School Ave.  
Shelby, Ohio 44875

— Products: printed forms, card sets, paper products

# When you order computer supplies from JTC there's only one thing to look out for.

# This truck.



No matter what you order from JTC—cards, tape, computer ribbons, disc packs, tape rehabilitation—you know you'll get the finest products and service available. Plus the fastest delivery.

That's how we built our business. And our reputation.

JTC supplies most of the leading computer users in the area. Our sales engineers and office staff are there when you need them for help and advice. We have our own fleet of trucks—and an experienced traffic department making up schedules to meet your specific delivery requirements.

The result? You get the right supplies. At the right price. At the right time. From the company that does things right. JTC.



Data Processing Cards • Computer Tapes  
Ribbons • Disc Packs • Tape Maintenance  
**Jersey Tab Card Corporation**  
649 Rahway Avenue  
Union, New Jersey 07083  
(N.J.) 201 MU 8-1700  
(N.Y.) 212 WO 4-2930

(Continued on Page S/9)



## DP Accessories Firms

(Continued from Page S/8)

Gates Acoustinet Inc.  
Santa Rosa, Calif.

— Products: acoustical enclosures

General Binding Corp.  
Northbrook, Ill. 60062

— Products: book bindings for computer print-outs, paper handling

GE Information Devices  
4000 NW 39th Expressway  
Oklahoma City, Okla.

— Products: disk tapes, printers

R. P. Gillotte, & Co., Inc.  
929 Holland Ave.  
Cayce, S.C. 29033

— Products: distributors, suspended files for printouts, housings

GKI General Kinetics Industries  
Isaac Newton Square  
Reston, Va. 22070

— Products: magnetic tape cleaners, tape winders, cleaner evaluator, tester, and eraser.

Graham Magnetics, Inc.  
Gatham, Texas

— Products: computer type

Graphic Communications Corp.  
Moonachie, N.J.

— Products: offset duplicating, photocopying machines

Herbert Products Inc.  
100 Linden Ave.  
Westbury, N.Y. 11590

— Products: static eliminators for high-speed printers, electrical-mechanical punchcard cleaner.

Hollander/Kimball Systems  
385 Gerard Ave.  
Bronx, N.Y. 10451

— Products: punch tag to machine language, online & offline reader, tag reader from punched tags

Honeywell  
1 Washington St.  
Wellesley, Mass. 02181

— Products: forms, magnetic tape, disks, environmental

Ideal Electric  
Mansfield, Ohio 44903

— Products: power back-up units

IBM

112 E. Post Rd.  
White Plains, N.Y.

— Products: forms, magnetic tape, disk, environmental

Jersey Tab Card  
649 Rahway Ave.  
Union, N.J. 07083

— Products: computer ribbons, tapes, disk packs

Kleer-Vu Ind. Inc.  
New York, N.Y.

— Products: copy cards for microfilm, jackets for the microfilm

Kodak  
Rochester, N.Y.

— Products: microfilm and copiers

Kybe Corp.  
132 Calvery St.  
Waltham, Mass.

— Products: disk pack cleaners, magnetic tape cleaners, certifiers

Label House  
Pewaukee, Wisc.

— Products: paper labels

Liebert Corp.  
Columbus, Ohio

— Products: environmental control

(Continued on Page S/12)

Home office	Nashua Corporation 44 Franklin Street Nashua, New Hampshire 03060 (603) 883-7711
Albany	Denham Associates Delmar, New York 12054 (518) 489-2519
Atlanta	Nashua Corporation (404) 261-3485
Baltimore	Nashua Corporation Jarrettsville, Maryland (301) 557-7694
Boston	Nashua Corporation Nashua, New Hampshire 03060 (617) 729-7850
Chicago	Nashua Corporation Elmhurst, Illinois 60126 (312) 832-4300
Cleveland	Nashua Corporation (216) 464-2072
Denver	Rocky Mountain Tab Card Co. (303) 399-0730
Des Moines	F.W. Johnson Co. (515) 244-0162
Detroit	Nashua Corporation Harper Woods, Michigan 48225 (313) 886-9890
Kansas City	John H. Clements, Inc. Blue Springs, Missouri 64015 (816) 842-6750
Los Angeles	Nashua Corporation Compton, California 90221 (213) 537-4250
Miami	Dade Business Systems (305) 696-2721
Milwaukee	Milwaukee Tab Company (414) 271-7674
Minneapolis	Moe Hawk (612) 331-6500
New Orleans	Data Processing Accessories Metairie, Louisiana 70005 (504) 833-3731
New York	Nashua Corporation (212) 532-6500
Philadelphia	Nashua Corporation Bala-Cynwyd, Penna. 19004 (215) 839-3535
Phoenix	Compucolor West, Inc. (602) 274-2555
Rochester	Pad, Inc. (716) 271-1737
Salt Lake City	Nu Business Systems, Inc. (801) 278-9516
San Francisco	Nashua Corporation (415) 861-0720
Seattle	Data Forms, Inc. (206) 624-2873
Washington	Nashua Corporation Arlington, Virginia 22201 (703) 524-8880
Canada	
Montreal	Nashua Canada Ltd. (514) 861-9791
Peterborough	Nashua Canada Ltd. (705) 743-1120 (Home Office)
Toronto	Nashua Canada Ltd. (416) 231-5617
Vancouver	Nashua Canada Ltd. (604) 684-8010

# The particle people are hungry for your disc pack business.



Nobody knows more about discrete particle technology than the people at Nashua. Particles for a wide variety of coatings on paper, plastic and metal substrates have been their business for more than 40 years.

They have put this expertise into the production of disc packs. Ultra-sensitive, high-speed, error-free disc packs, made

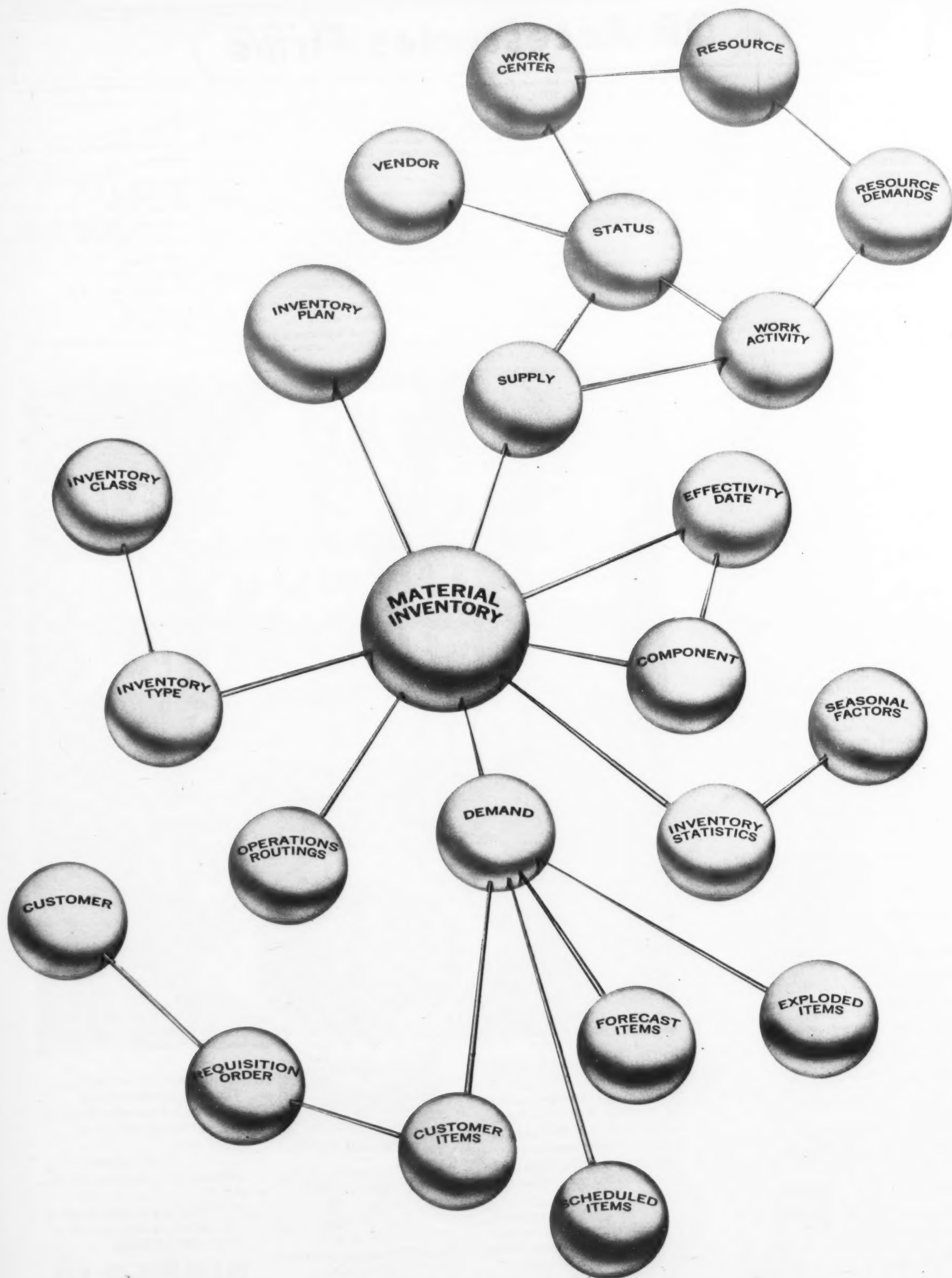
possible by sophisticated manufacturing and testing facilities.

A 30-day cancellation plan. A flexible program that lets you make the switch-over easily one at a time.

A substantial cost savings. These are just a few of many inducements the hungry particle people can offer you.

It's worth a few minutes of your time to call (603) 883-7711 or your local Nashua office. Nashua Corporation, Nashua, New Hampshire 03060

**NASHUA**





# Compare other data base management systems with General Electric's Integrated Data Store

Use this check list to compare I-D-S with any other data base management system you know:

	GE I-D-S	OTHER		GE I-D-S	OTHER
Creates a variety of data structures according to user definition:			Includes all random organization methods	<input checked="" type="checkbox"/>	<input type="checkbox"/>
• hierarchies	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Dynamically allocates and deallocates data storage space	<input checked="" type="checkbox"/>	<input type="checkbox"/>
• tree structures	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Data base can reside on a mixture of random access devices	<input checked="" type="checkbox"/>	<input type="checkbox"/>
• networks	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Eliminates the need for designed overflow areas	<input checked="" type="checkbox"/>	<input type="checkbox"/>
• unlimited combinations of the above	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Available data storage space is perpetually inventoried	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Eliminates need for redundant data	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Simple, powerful, easy-to-use language	<input checked="" type="checkbox"/>	<input type="checkbox"/>
No user intervention required in maintaining data structure linkages	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Offers nine methods for record retrieval	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Protects against the storage of duplicate data	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Permits movement through the data base in any direction	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Control key modification automatically adjusts data base relationships	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Reduces system implementation time	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Gives ten choices for the physical placement of records	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Proved effective through worldwide use in a variety of businesses	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Provides versatility in ordering a set of records:			Extensive error analysis is provided	<input checked="" type="checkbox"/>	<input type="checkbox"/>
• sorted	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Flexible debug aids	<input checked="" type="checkbox"/>	<input type="checkbox"/>
• first in, first out	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Data base accessible by COBOL or FORTRAN object programs	<input checked="" type="checkbox"/>	<input type="checkbox"/>
• last in, first out	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Supported by extensive utility routines	<input checked="" type="checkbox"/>	<input type="checkbox"/>
• random	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Continuous journalizing of data base for recovery purposes	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Unlimited number of entry points into the data base	<input checked="" type="checkbox"/>	<input type="checkbox"/>	File protection by software	<input checked="" type="checkbox"/>	<input type="checkbox"/>



Regardless of what business you're in, General Electric computers with Integrated Data Store (I-D-S) can revolutionize your data base management capabilities. It can improve your efficiencies at running far more than just production control (as illustrated here); it can upgrade personnel, finance, customer record, and many other functions, as well, in virtually any industry from banking to manufacturing. You tailor your own I-D-S system to the types of retrievals you think are best for your business. Your information is then linked together into networks wherein the prime element in one network may be subordinate to another. Redundancy is eliminated.

I-D-S users are believers. They call it "the next generation of data base management systems." But you can have it now to unite your computers . . . unite your people . . . unite your business as no other data base management system can. Start by calling your nearest General Electric Information System Sales Representative.

Or write to Section 290-73A, General Electric Company, Schenectady, New York 12305.

**GENERAL  ELECTRIC**

## General Electric Computers: The United Systems of the 70's

# DP Accessories Firms

(Continued from Page S/9)

Magna-Visual, Inc.  
1200 N. Rock Hill Road  
St. Louis, Mo. 63124

— Products: magnetic plastic letters and symbols for magnetic board, magnetic logos

Magnetic Resources  
509 W. 164th St.  
Brook Park, Ohio  
— Products: disk packs

Mailers Tying Machine  
40 W. 15th St.  
New York, N.Y. 10011  
— Products: microfilm readers

Magnetic Aids Inc.  
11 W. 42nd St.  
New York, N.Y. 10036  
— Products: flow charts, control boards

Magnagraph  
135 W. 41st St.  
New York, N.Y. 10036  
— Products: flow charts, magnetic control board, scheduling board, flogrammer

Memorex  
Memorex Park  
Santa Clara, Calif. 95050  
— Products: computer tape, microfilm printers, disk packs, tape cartridges, storage devices, magnetic cards

Methods Research Corp.  
44 Willow Ave.  
Staten Island, N.Y. 10305  
— Products: magnetic boards

Micro Seal Corp.  
Skokie, Ill.  
— Products: aperture cards, viewer verifiers

Mesa Inc.  
Fairfax, Ala.  
— Products: disk packs

Mac Panel  
Box 5027  
High Point, N.C.  
— Products: make magnetic tape, sell disk packs

J.L. McIntosh Inc.  
141 W. 2nd St.  
Boston, Mass.

National Cash Register Co.  
Dayton, Ohio  
— Products: forms, magnetic tape, disks, environmental

Novation Inc.  
18664 Topham St.  
Tarzana, Calif. 91356  
— Products: acoustic coupler, Teletype enclosure

National Lead  
Floating Floor Division  
New York Area  
— Products: raised floors, environmental systems

National Blank Book Co.  
Holyoke, Mass. 01040  
— Products: housing devices for printouts, binders for programmers

Nashua Corp.  
Nashua, N.H.  
— Products: disk packs

Norton Automatic Doors  
372 Meyers Road  
Bensenville, Ill.

— Products: computer room power doors

Original Computer Products, Inc.  
204 Worcester St.  
Wellesley Hills, Mass.  
— Products: phototypesetting cabinets for packs and disks

Output Systems, Inc.  
74 Reade St.  
New York, N.Y. 10007  
— Products: forms

Pitney-Bowes  
8055 Crosby St.  
Stamford, Conn. 06904  
— Products: printout inserters, folding machines, copiers, controls for disk feeders

Peripherals (Computer Link Corp.)  
Waltham, Mass.

Photon Inc.  
355 Middlesex Ave.  
Wilmington, Mass. 01887  
— Products: photo-type setting equipment

Plastic Coating Corp.  
Holyoke, Mass.  
— Products: microfilm

Frederick Post  
Box 803  
Chicago, Ill. 60690  
— Products: microfilm

Power Systems & Controls  
Richmond, Va.  
— Products: stand-up power systems

Precision Data Companies  
1491 Yonge St.  
Toronto 7, Ont. Canada  
— Products: data processing cards, magnetic tape cleaner, middleman disk packs and tapes and ribbons

Robins Data Devices Inc.  
15-58 127th St.  
Flushing, N.Y. 11356  
— Products: Teletype winders,

coders, splicers, fanfolds, perforated tape disk drives

RCA  
Camden, N.J.  
— Products: forms, magnetic tapes, disks, environmental

Singer-General Precision Inc.  
Sunnyvale, Calif.  
— Products: output microfilm

Jay Smith  
292 State St. E  
Westport, Conn. 06880  
— Products: distributors for check digit calculator tape winders, punchers, splicers

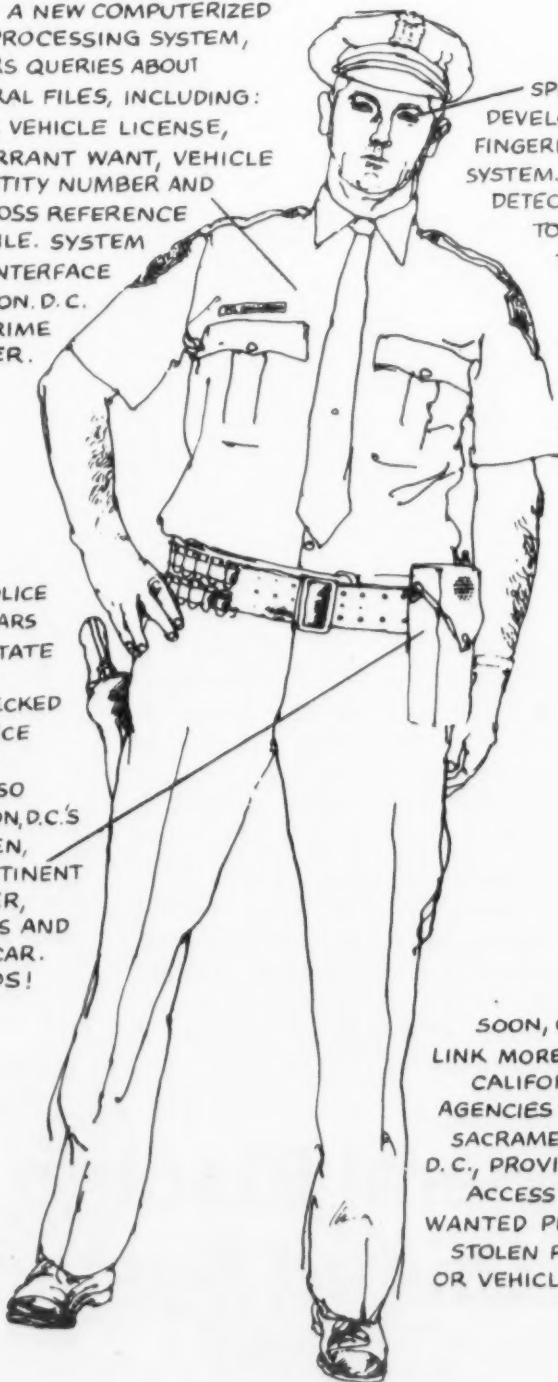
(Continued on Page S/13)

OUR NETWORK ALLOWS AN UNDERMANNED POLICE FORCE TO PROTECT LARGE POPULATION AREAS. IN SECONDS, ALERT, A NEW COMPUTERIZED TELEPROCESSING SYSTEM, ANSWERS QUERIES ABOUT SEVERAL FILES, INCLUDING: NAME, VEHICLE LICENSE, WARRANT WANT, VEHICLE IDENTITY NUMBER AND CROSS REFERENCE INDEX FILE. SYSTEM CAN ALSO INTERFACE WITH FBI'S, WASHINGTON, D.C. NATIONAL CRIME INFORMATION CENTER.

OUR NETWORK LETS POLICE CHECK OUT SUSPICIOUS CARS BY RADIO. OUT-OF-STATE LICENSES ARE CALLED TO HEADQUARTERS AND CHECKED THROUGH THE STATE POLICE COMPUTER SYSTEM. IF NECESSARY, THEY ARE ALSO RUN THROUGH WASHINGTON, D.C.'S SYSTEM. IF A CAR IS STOLEN, COMPUTER TRANSMITS PERTINENT FACTS, VIA TELETYPEWRITER, BACK TO HEADQUARTERS AND THEN TO WAITING PATROL CAR. ALL WITHIN 15 SECONDS!

SPECIALISTS ARE DEVELOPING A COMPUTERIZED FINGERPRINT CLASSIFICATION SYSTEM. USING OUR NETWORK, DETECTIVES WILL BE ABLE TO IDENTIFY "SCENE OF THE CRIME" FINGERPRINTS WITHIN SECONDS.

SOON, OUR NETWORK WILL LINK MORE THAN 450 CALIFORNIA LAW ENFORCEMENT AGENCIES TO CRIME FILES IN SACRAMENTO AND WASHINGTON D.C., PROVIDING INSTANT ACCESS TO INFORMATION ON WANTED PERSONS, LOST OR STOLEN PROPERTY, FIREARMS OR VEHICLES.





# DP Accessories Firms

(Continued from Page S/12)

Saunders Mfg. Co.  
Winthrop, Maine

— Products: aluminum holders for cards, OCR forms

Sturgis Newport  
Box 31

Sturgis, Mich. 49091

— Products: data processing forms

A.M. Steigerwald Co.  
2160 N. Ashland Ave.  
Chicago, Ill.

— Products: cassette labels, reel labels, paper manufacturing of labels

Smead Mfg. Co.  
Hasting, Minn.

— Products: card guides, IBM card filer

Shelby Business Forms Inc.  
Shelby, Ohio 44875

— Products: paper products, card sets, continuous forms

Service Business Forms  
815 E. 2nd St.  
Wichita, Kan.

— Products: OCR-type form, microline glued continuous custom forms

Scanforms  
Benjamin Fox Pavilion  
Jenkintown, Pa.

— Products: optical scanning forms, computer forms

Severn Products Inc.  
Severn Park, Md.

— Products: access flooring

Thin Film Inc.  
961 E. Slauson Ave.  
L.A., Calif. 90011

— Products: magnetic tape, video disks

Tab Products Co.  
2690 Hanover St.  
Palo Alto, Calif. 94304

— Products: tape storage forms, forms storage and handling equipment, card storage, disk storage, and binder

Thomas Collators  
8023 Atlantic St.  
Stamford, Conn. 06904

— Products: form handling equipment

2-B System Corp.  
Madison Heights, Mich.

— Products: plastic cards affixed to foldout form

Minnesota Mining & Mfg.  
St. Paul, Minn. 55101

— Products: magnetic tape, instrumentation tape, electron beam recorder

U.S. Magnetic Tape  
Huntly, Ill. 60142

— Products: video audio and magnetic tape

Univac  
Bluebell, Pa.

— Products: forms, magnetic tape, disks, environmental

Virginia Panel Corp.  
Waynesboro, Va.

— Products: tape racks, tape cleaner, control panels, and combination tape certifiers

Visual Control Assoc.  
350 Schmale Road  
Wheaton, Ill. 60187

— Products: visual control charts

Wilson Jones  
6150 Touhy Ave.  
Chicago, Ill. 60648

— Products: binders for paper products

Wassell Or, Inc.  
Westport, Conn.  
— Products: wall charts, paper products

Westinghouse Electric  
4300 36th St.  
Grand Rapids, Mich. 49508

— Products: walls and floors, air access flooring, computer room air conditioning, partition for computer rooms

Wrightline  
160 Gold Star Blvd.  
Worcester, Mass. 01606

— Products: storage and filing equipment for disk packs, tapes, and cards

Xerox  
Rochester, N.Y. 14603

— Products: printout copiers, forms

Data communications helps enforce the law and protects the public.

Next time you're moving information, remember—no one knows more about moving it than the people who run the world's largest communications network.



## DP Accessories Feel the Touch Of Madison Ave.

By Christine Magnuson  
CW Staff Writer

What's in a name? At least in data processing accessories, the selection of names sounds more like television advertisements.

Memorex chose Astron, the Greek word for star, to describe its new double-surfaced magnetic tape.

The Digitpunch, from Pivan Data Systems Inc., perforates punched paper tape. Logically, the Digitscan scans digital data.

The Swinger (not Polaroid) stores disk packs for Engineered Data Products, while the Carousel (not Kodak) stores cartridges for Rose-Wood of California, Inc.

The Inspector has nothing to do with Sherlock Holmes, but is instead a magnetic tape cleaner and evaluator from Graham Magnetics Inc. The Tapeworm is, of course, a device to store, wind, and rewind paper tape and comes from Metro Machine and Engineering, Inc. The tape extrudes through a worm's mouth on the cartridge, no less!

The Comsole is, of course, the console unit for a Computer-Output Microfilm unit from Prestoseal Manufacturing Corp. The Data-Verter turns data into information in supermarkets, and comes from Digitronics Corp.

## Are your computer mailings as warmly personal as this?

Everyone pays more attention to mail in a conventional envelope with the address typed on the envelope itself. Did you know you can give your computer mailings this warmly personal look with our Chain-O-Matic continuous envelopes? They look like conventional envelopes rather than some kind of folded form. They're securely attached to the carrier sheet along both short sides, so they run smoothly through your printer for "typed" addressing directly on the envelopes. Then, stripped from

the carrier sheet, they run smoothly through your inserting and postage metering equipment because of their conventional construction. Available in large and small envelope sizes. Is our Chain-O-Matic system a better way to handle your addressing and mailing in volume? It is. And that's the way it is with all our products, because we continually look for ways to make each of our envelopes and forms more useful to you. For samples, write: C-O-M Envelopes, Curtis 1000 Inc., 1000 Curtis Drive SE, Smyrna, Ga. 30080.



# CURTIS 1000

making envelopes and forms more useful to you

## Users Pick Disk, Tape, And Forms Vendors

IBM's control over disk and tape sales has dropped sharply over recent years, according to a recent study done by *Computerworld*.

One thousand questionnaires were mailed out to CW subscribers, asking their opinions and data for purchasing continuous forms, magnetic tape, and disk packs. Out of the 370 responses, only 35% of the users were buying their disk packs from IBM. Only 27.7% were buying tape from IBM.

IBM was still the most frequently mentioned supplier of disks, but Memorex surpassed IBM in tape, with 34% mentioned.

The forms business was highly segregated. Three large companies, Moore Business Forms, Standard Register Corp., and Uarco, represented about 90% of the forms business. Users rated these companies on quality and service.

The remaining 10% of the business is divided among several dozen local firms with small volumes and limited supply capability, users indicated.

### Disk More Popular

Today, 62.4% of the installations responding were using disks. Five years ago, the number was less than one-half of that. Over 40% of the installations responding did not use magnetic tape at all, a sharp drop over recent years.

Users are distributing their business to many more companies today than five years ago.

All the major manufacturers, once the only factor in the accessories business, have lost many of their customers, mainly, according to users, because the smaller or more independent firms are offering more competitive prices on smaller quantities.

Unlike the independent peripherals market, accessories customers do not have any fear of maintaining several suppliers. In fact, some of the users trade off suppliers against each other to keep prices down and improve deliveries. There is also very little pressure today from the manufacturer to purchase its accessories.

In 1956, IBM signed a consent decree where the company agreed IBM would never attempt to monopolize the punched-card market. Users have said that, prior to that time, IBM had placed great pressure on users who went outside IBM for cards or other supplies. This pressure has completely disappeared, users feel.

The biggest factor in the accessories market is the tremendous growth in the use of disks. Removable disks were only a small business when IBM introduced them in the early 60s. Today many companies compete for customers, offer "deal" prices, and promise immediate delivery.

The user must now find means to evaluate the quality of each competing product, find ways to insure delivery, and talk to other customers of the same company for information.

### Section A Continuous Forms

1. Do you use continuous forms?  
Yes - 356 (95.6%)      No - 14 (4.4%)
2. What was your expenditure for forms last year? (Principal groups)  
\$3,000 to \$5,000 - 48 (13.4%)  
\$10,000 - 32 (8.9%)  
\$20,000 to \$25,000 - 38 (10.6%)
3. List names of best known forms suppliers. Top 3 names:  
Moore Business Forms - 317 (89%)  
Standard Register - 244 (68.5%)  
Uarco - 236 (66.2%)
4. Rate the names listed above.  
Chosen as First:      Chosen as Second:  
Moore - 121 (33.9%)      Moore - 60 (16.8%)  
Standard Register - 57 (16%)      Uarco - 57 (16%)  
Uarco - 52 (14.6%)      Standard Register - 48 (13.4%)

### Section B Magnetic Tape

1. Do you use tape?  
Yes - 220 (59.4%)      No - 150 (40.6%)
2. About how many reels of tape did you purchase in 1969?  
50 and under - 74 (33.6%)      201 to 500 - 35 (15.9%)  
51 to 100 - 31 (14%)      501 to 10,000 - 18 (8.1%)  
101 to 200 - 42 (19%)
3. What manufacturer did you purchase from?  
Memorex - 75 (34%)      3 M - 54 (24.5%)  
IBM - 61 (27.7%)      Graham - 29 (13.1%)

### Section C Disk Packs

1. Do you use disk packs?  
Yes - 231 (62.4%)      No - 139 (37.6%)
2. About how many disk packs did you purchase in 1969?  
1 to 5 - 35 (15.1%)      21 to 50 - 33 (14.2%)  
6 to 10 - 38 (16.4%)      over 50 - 15 (6.4%)  
11 to 20 - 36 (15.5%)
3. What manufacturer did you purchase from?  
IBM - 81 (35%)      Athana - 18 (7.7%)  
Memorex - 67 (2.9%)      Caelus - 17 (7.3%)

The numbers shown are the number of actual responses, and the percentage of the appropriate section group.



# User Says Tape Error Losses Were Almost \$500,000

Richard C. Munn

Special to Computerworld

One large user claims that losses from tape errors reached nearly \$500,000 in 1968 alone. This user, with a library of over 20,000 tapes, a 360/65, two 360/50s, and two 360/30s, recently conducted a study to determine what tape errors were costing the installation. The company determined that over 1,000 tape "hangs" were occurring each day.

Two-thirds of the cost was attributed to rerun time needed to reconstruct data from unreadable tapes. The remainder was attributed to time wasted during reruns while the tape had to be reread or rewritten over dropouts.

No estimate was attempted for the cost of rescheduling critical jobs where data reconstruction was necessary. Loss of effectiveness through delayed reports, additional tapes, or tape drives due to inefficient operation caused by errors, and the like were also not estimated in the \$500,000 cost.

The user decided that to maintain long-term controls on tape quality, most of the tape library should be replaced. The replacement allowed the installation to keep precise records on tape usage and maintain exact control on recertification and cleaning.

## Economics of Tape Problems

The third generation user is hardly aware of how tape problems are being dealt with.

Most operating systems contain extensive input/output error detection and recovery facilities. Marginal errors that are successfully recovered do not produce any indication to the users. Of course, permanent or irrecoverable input/output errors are reported to the user or at least his customer engineer in the form of system error reports or when a job must be terminated prematurely due to a read failure.

Based upon the operating characteristics of the IBM 2401 Model 6 tape drive, it can be shown that a tape with 10 write-dropouts will take .28% longer to process than a tape with no write-dropouts. The company's studies show that there will normally be twice as

much delay caused by the various automatic read error recovery routines that may be called into play on the same tape operation.

Assuming that the average IBM 360/40 or 50 user spends \$23,000 per month on machine rental for that machine and the normal three times that amount for salaries, spaces, software, etc., it can be shown that a write-dropout costs about 1.6 cents.

## How Bad Can a Tape Get?

In the course of one customer's study, they analyzed a portion of their tape library to determine its actual condition. The accompanying chart shows that tape errors increase dramatically with time and usage.

This particular company estimated that it cost 2 cents per error in lost computer time to handle a write-dropout. One of the major automotive companies recently conducted a study showing that their costs approach 15 cents per write-dropout. Even using the 2 cent per write-dropout figure, every time a 2-year old tape category was used, this company wasted \$5.24 in lost computer time.

What was the problem? For one thing, this particular company did not have an organized program for tape library care. There was no program for regularly cleaning tapes, and there was no ready means available for the user to determine which tapes to discard from the library, which tapes to use or not use on critical runs, etc.

## The Terminology of Tape Care

Tape cleaning refers to the mechanical removal of particles which have or could cause errors on the tape drive. There are several methods of tape cleaning in use which vary in effectiveness and principle. Magnetic tape cleaners employ high-performance cleaning blades or long-life ceramic blades to "re-surface" the tape and remove particles as well as wiping tissues to "mop up" loose and lightly adhered particles.

Tape testing is normally the automatic inspection of tape to determine the number of potential write-checks that may be

found on that particular tape. A bit pattern of all ones is normally written across the surface of the tape and then read back in the proper format and density at a signal level that is correlated to the actual tape drives in use. Tapes may then be classified as good, marginal, or candidates to be discarded.

Tape recertification or rehabilitation is performed in a start-stop mode of operation. The tape may be automatically cleaned, and during testing the tape will be stopped at point of error. With manual intervention the defect is removed.

## Benefits of Maintenance

The table shows the results of a recent study by Kybe Corp. of the cleaning efficiency possible with their new system employing high performance blades and wiping tissues.

At a cost of 2 cents per dropout, effective tape cleaning can easily save the normal user anywhere from 50 cents to \$1.25 each time a tape is run on a computer.

## What Can the User Do?

Like the car owner who follows the recommended or prescribed preventive maintenance program of the manufacturer, the user can also follow a program of regular preventive maintenance with his tapes. The heart of the tape maintenance system is a very simple label that helps the user follow a prescribed tape maintenance program.

The Kybe-recommended tape program is to place a check mark on the label every time the tape is mounted on the tape drive. At the end of five uses with 3200 FCI tape, or 10 uses with 800 bit/in. tapes, the tape is cleaned. After 25 uses with 3200 FCI or 50 uses with 800 bit/in. tape, the tape is tested to determine whether it should be continued in service, discarded, or rehabilitated.

## Evolution of Maintenance

In the mid-50s when magnetic tape first came into wide use as a data storage medium, no one realized that its reliability would markedly decrease with use.

Theoretically, magnetic tape will perform satisfactorily for

thousands of passes. Practically, its life is shortened by the effects of every day use.

The major cause of reduced tape efficiency is not physical wearing away of the oxide coating, but rather contamination from particles generated during normal tape use. As the tape passes across the write and read

certifier was normally a special purpose tape drive which wrote all ones across the surface of the tape and attempted to read them back at a minimum acceptable signal level. When a dropout occurred, the certifier stopped the tape and repositioned the suspect area so that an operator could manually scrape the tape

Tape Serial No.	Errors* Before Cleaning	Errors After Cleaning	Cleaning Efficiency
J1607	97	0	100%
J1634	66	0	100%
J1611	155	0	100%
J0432	4	1	75%
J0934	38	5	94%
J1526	171	1	99%
J2022	37	4	89%
J2041	26	1	96%
J1703	59	2	98%
J2046	26	1	96%
J1296	29	1	97%
J2876	8	0	100%
J1810	79	3	96%
J0431	21	0	100%
J1943	19	0	100%
J0928	29	1	97%

\*Errors for 9-track, 800 bit/in. tapes tested at 32% signal threshold

Chart shows working efficiency of tape cleaning system.

heads and around guides, particles from both the oxide surface and polyester backing break loose and start to contaminate other portions of the tape.

Electrostatic attraction of the particles causes them to clump together and cling to the surface of the tape. In time, these particles become bonded in clumps which grow larger as the tape continues to be used.

These clumps in turn lift the tape away from the read/write heads and cause a reduction of magnetic signal strength. If the signal strength is reduced below a certain point, a write error or even worse, a read error, can result. A particle only one-thousandth of an inch high would cause a read error in a 800 bit/in. system.

For comparison purposes, imagine a perfectly flat and smooth six-lane highway between New York City and Chicago and a small stone less than one and one-fourth inches high resting on the surface. Although a driver would hardly notice such a stone, a computer actually comes to a complete halt because it cannot "read" the data located under a comparable spot.

In the early 1960s, the only way to remove clumps and particles that were causing dropouts from a tape was to pass the tape through a certifier. The

surface with a scalpel. This was a slow and tedious process.

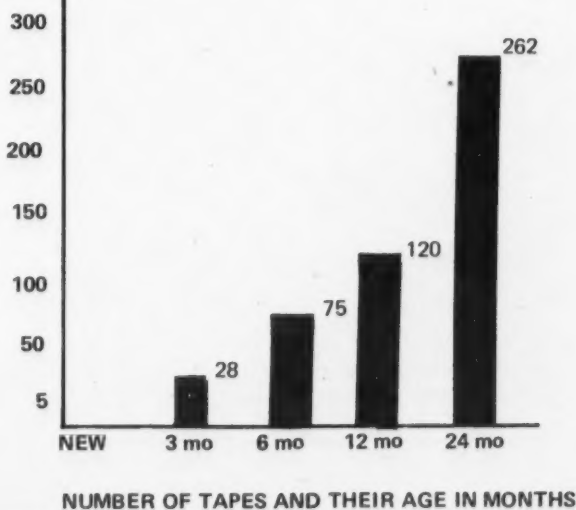
In 1968, Kybe introduced a magnetic tape tester that helped the user determine whether to continue using a tape, discard it, rehabilitate it, or restrict its use to noncritical applications.

The company, and other companies since, have also introduced combination cleaners/certifiers/testers to assist users in maintaining the quality of tape libraries.

Memorex Corp. has introduced a new magnetic tape, called Astron, that may reduce errors because the backing is no longer a polyester that can flake or hold static electricity. The new smooth backing could provide far fewer tape errors over the life of a tape.

Richard C. Munn is the vice-president of marketing for Kybe Corp., a company that manufactures tape testing and rehabilitation equipment and operates rehabilitation centers around the country. Kybe originally supplied most manufacturers with tape certification equipment in the early 60s.

AVERAGE NUMBER OF ERRORS PER TAPE



Graph displays number of errors per tape in different usage/age categories for 9-channel, 1,600 bit/in. tapes tested at 35% threshold.

## TELETYPE USER

Teletype Rolls and Forms.  
Paper Tape Rolls and Fan-folded. Winders, Splicers, Punches, Storage Containers and other Tape Devices.  
Acoustic Shields  
For Free Catalogue  
Terminal Equipment Sales & Service  
3713 Grand Blvd. Suite 109  
Brookfield, Illinois 60513  
312/485-6065

## MICRO FILMING SERVICE

COM and other processes available:

- \* Exceptional Service
- \* Dependability
- \* Competitive Rates

Call us:

**NATIONAL COMPUTER SUPPLY CORP.**

530 70th Street  
Guttenburg, N.J. 07093  
(201) 868-3133

Ask about our complete line of products and services.

# Lack of Tape Certification Biggest Problem for User

Special to Computerworld

The operational reliability and productivity of any computer installation are no better than the faultiest equipment or material being used. Therefore, according to Charles Burt, director of operations at the CBS Data Center in New York City, one of the basic tasks of data processing management is to find and eliminate, or control, an installation's weak links.

"One of the materials often taken for granted in computer installations is magnetic tape," Burt said, "and yet bad magnetic tape often is the cause for operational delays and low productivity."

Burt indicates that CBS has improved throughput and reduced processing delays substantially in its multi-System/360 data center by applying strict maintenance and testing procedures to all of its 7,000-reel magnetic tape library.

"It's difficult to estimate the savings of a program like tape maintenance," Burt said. "In part, your savings depend on how old your tapes may be and what kind of shape they are in."

## More Savings

"However, I am certain that CBS is saving more, and our equipment utilization and personnel productivity are being improved at a rate which is several times greater than our expenditures for tape maintenance."

Burt explains that in the spring of 1968, the CBS Data Center began a special evaluation of its tape library to avoid reruns and processing delays caused by tape problems such as read/write failures due to accumulated oxide particles on the tapes. This type of problem is not unusual and it can have an impact on operational efficiency to a degree which requires corrective action.

CBS selected a representative sample of 400 reels of tape and sent them to the Kybe Corp. for testing and recertification. The tests performed on the tapes were at regular operating standards — 800 bit/in. density in both 7- and 9-channel recording formats.

Forty per cent of the tape footage and 25% of the reels were found to be unfit for service. Many of the tapes contained permanent errors which could not be removed. Much of the tape indicated edge-stretch caused by accumulations of loose oxide which eventually caused permanent deformation.

On the basis of this scrap rate, and because CBS was planning for a future upgrading to 1,600 bit/in. tape drives, it was decided that it would be wiser to replace all of the tapes in the library at that time rather than to try to recertify and rehabilitate them. New tapes were phased in for the entire library as fast as operating schedules permitted.

"At the same time," Burt explained, "this experience proved to us that tape problems such as stretch and oxide buildup were potentially severe and costly. Certainly, we did not want to put ourselves in a position again where, in the face of continually increasing workloads, we would be forced to replace all of our tape in order to maintain efficiency. We determined that, since we were starting with new tapes, it would definitely be worthwhile to set up a tape maintenance program on an organized, enforced basis."

Under the present CBS program, each tape reel in the library carries a label on which all runs are logged in pencil when the reels are mounted on the tape drives.

## Kybe Cleaner

After a tape has been used 10 times, it is processed on a Kybe cleaner. In this operation, the tape cleaner utilizes a blade which trims embedded particles or built-up nodules of oxide materials. In addition, the tape is wiped on both sides by lint-free tissue. The wiping by these tissues removes any oxide or mylar particles which may have adhered to either

side of the tape. Normally, anywhere between 75% and 90% of removable errors are eliminated in the cleaning process.

Burt said that the cleaning process does not affect data recorded on the tape. The magnetic properties of the tapes are not degaussed in any way.

When a tape has been used 50 times, CBS procedures provide for it to be tested completely before being put back into service. Tape testing is handled on a unit purchased by CBS at the time its new tapes were put into use — a Kybe CT-100 tester.

In its initial operation, this tester performs a cleaning function similar to the tape cleaner itself. Tapes are cleaned on the forward and reverse passes before and during testing, assuring that transient errors are removed.

Test runs on CBS tapes are closely monitored and the results are fully documented by means of counters and a

locator chart on the control panel of the tape tester. Each test run creates a circular chart which records the location of all write dropouts and physical damage errors. The number of write dropouts, physical damage errors, hypercritical dropouts, and tape length are also recorded on counters.

Where permanent errors such as oxide buildups, embedded particles, wrinkles, or creases are noted, a decision must be made on whether to cut or discard the tape. The majority of these problems, Burt said, occur within the first few hundred feet of the tape. In such instances, the front end is generally cut off and the tape put back in service.

Burt said that these operations are kept in the CBS installation and are performed simultaneously at both hypercritical testing levels and tape drive write levels. CBS operates the tester set at a 45% hypercritical clipping level. That is, the machine tests tape to verify that 45% of

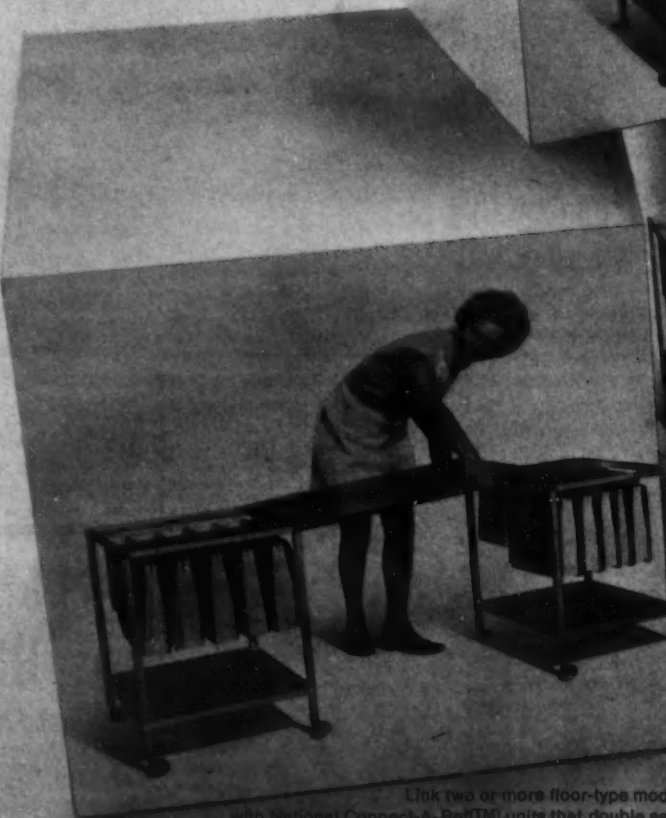
total signal strength recorded can be read back. This rate, according to Burt, provides a good operation quality cushion

(Continued on Page S/17)



CBS tape librarian operates the CT-100 tape tester.

Roll in one or more National Control-Rack(TM) units for convenient floor data referral. Takes any size binder in multiple configurations.



Protect data with a lockable, locking Control-Rack(TM) for confidential or restricted material.

Link two or more floor-type modular control stations with National Connect-A-Rack(TM) units that double as handsome desktops.



# Higher Density Disks Expected to Tighten Tolerances

By Peter L. Briggs  
CW Supplement Editor

Several manufacturers may announce new disk drives with double the current density, according to many industry sources. Among the manufacturers mentioned for impending announcement are IBM, Honeywell, and Information Storage Systems. Some observers expect an IBM announcement this June.

Current IBM-compatible disk drives read and write at 2,400 bit/in. densities. The higher density units are expected to use a 4,800 bit/in. density. Doubling the density essentially doubles the amount of data that can be stored on a single pack, though increases could be even greater due to better surface utilization.

When IBM introduced the 1311 disk drive for the 1401 computer, a single pack could store only about 2 million characters, and the access time, because the data was spread out all over the pack at about 1,200 bit/in. and the rotational

speeds were so low, was only about 250 msec. Existing 2311s offer average access times of about 75 msec with a total storage capacity of 7 million char/pack.

When IBM announced the 2311 for the 360, it looked very much like a 1311 that rotated twice as fast and had double the data density. The rumored new lines may offer only double density, or they may offer higher rotational speeds too.

Increasing the density requires a complete redesign of the drive as well as the disk pack. The heads must move much closer to the disk, down to only three or four microns. The surface of the pack must be absolutely perfect, for the slightest flaw can cause a disk crash, destroying the disk itself and perhaps the read/write heads.

## Air Pollution

The drive must be redesigned because minute particles of smog or smoke or any other type of air pollution accumulate on

the heads, cut down the tolerances, and cause crashes.

One designer said: "The cheap big air filter on the front of the drive keeps out the cigarette ashes, the expensive one is inside — it keeps out the smoke!"

Increasing the rotational speed also requires near perfection in disk making. Minute imperfections are too coarse to permit reading or writing on the surface. Initially, the rejection rate for new packs will be much higher, causing higher prices and longer delivery delays than users have

become accustomed to for the 2311 or 2314 disk packs.

What does happen is that users end up with fewer disk packs to store the same amount of data, buy fewer packs initially, and have more trouble with read errors. Parkinson's Law applies to the storage problem, thus the amount of available storage will always be filled by something, of whatever worth.

Users should anticipate no more than a slight improvement in storage usage, and that only temporarily.

## Certification Biggest Problem

(Continued from Page S/16)

and also indicates which tapes, though useable now, may give trouble in the future.

By comparison, he said, the actual write dropout level specification for drives is

32%. Since this level may vary slightly for a given installation the write dropout level of the Kybe tester is calibrated to that of the drives.

To make the tape maintenance program work, CBS developed and implemented a full set of operating procedures and established a training program for all employees who handle magnetic tape. In particular, CBS presents a two-hour training session which explains the proper methods for handling and storing tape and illustrates the importance of careful tape and tape drive cleaning.

Further, as a continuing check on the performance of individual tape drives and wear-damage, Burt set up a program under which four work tapes were specifically assigned to each individual drive in the CBS computer installation. These work tapes are used in sort runs and in other runs in which the tape need not be saved.

In an active installation, these work tapes are the most frequently used tapes in the system. They are cleaned and tested under the same procedures used for all of the other tapes. But, by designating them for use on specific tape drives, CBS also monitors the condition of the individual pieces of equipment within its computer installation.

## Handling Problems Explained

"This continual monitoring of peripherals," Burt explained, "is part of the operating control program we have instituted along with our tape cleaning and testing procedures. Any experienced operations man knows that problems often develop with tape handling equipment itself. For example, if tape drives are out of adjustment or malfunctioning they can cause tape stretching, creasing, tearing, and can wear the oxide coating at an abnormal rate.

"A certain amount of wear and tear is normal, of course. But, by associating special tapes with individual drives, we are also applying a continuing monitor on the operation of the equipment, adding both to tape life and overall system performance."

To illustrate the quality level now being maintained in the CBS tape library, Burt indicates that the acceptance level for testing has been set at 10 dropout errors, at tape drive levels, per 2,400 ft reel. If fewer than 10 errors are registered and no physical damage is reported on a reel of tape, it is returned to service immediately.

Where physical damage is recorded or where more than 10 errors are present, the tape may be cut and the reels returned to service, either as shortened full-length reels or as 1,200-ft or mini-reels. If this is not feasible, the tapes are discarded.

Thus, on a continuing basis, CBS is assuring reliable performance in an area where continuing degradation used to be a fact of life. Further, according to Burt, by monitoring quality on a continuing basis, CBS is side-stepping conventional costs of recertification and rehabilitation of tapes and the "big-lump" expense of the type encountered when a total library has to be replaced.

## National has a print-out storage system that's building-block simple.

It's called the National Data Reference Control System. But if that gets to be a hang-up in your mind, think of it as "The Building Block Approach" to computer print-out storage and reference control. It makes things easier all around.

It's also a beautiful way to put together a print-out control system that puts it all together for you. You get a total housing system including data binders and hanging devices

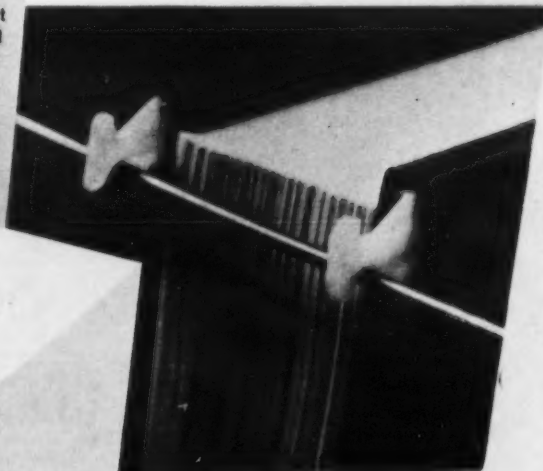
plus a complete selection of modular floor and desk-top referral and retention units. Meaning you can add-a-unit-here-add-a-unit-there and, literally, block out a record-keeping system that meets your exact requirements.

Get the full story now in our new free color brochure. (Needless to say, it's a block-buster!) Ask your National representative or mail the coupon.

National Blank Book Company, Inc.  
Dept. C  
Holyoke, Massachusetts 01940  
Please send me your new free Data Reference Control System brochure.

Name \_\_\_\_\_  
Title \_\_\_\_\_  
Company \_\_\_\_\_  
Street \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

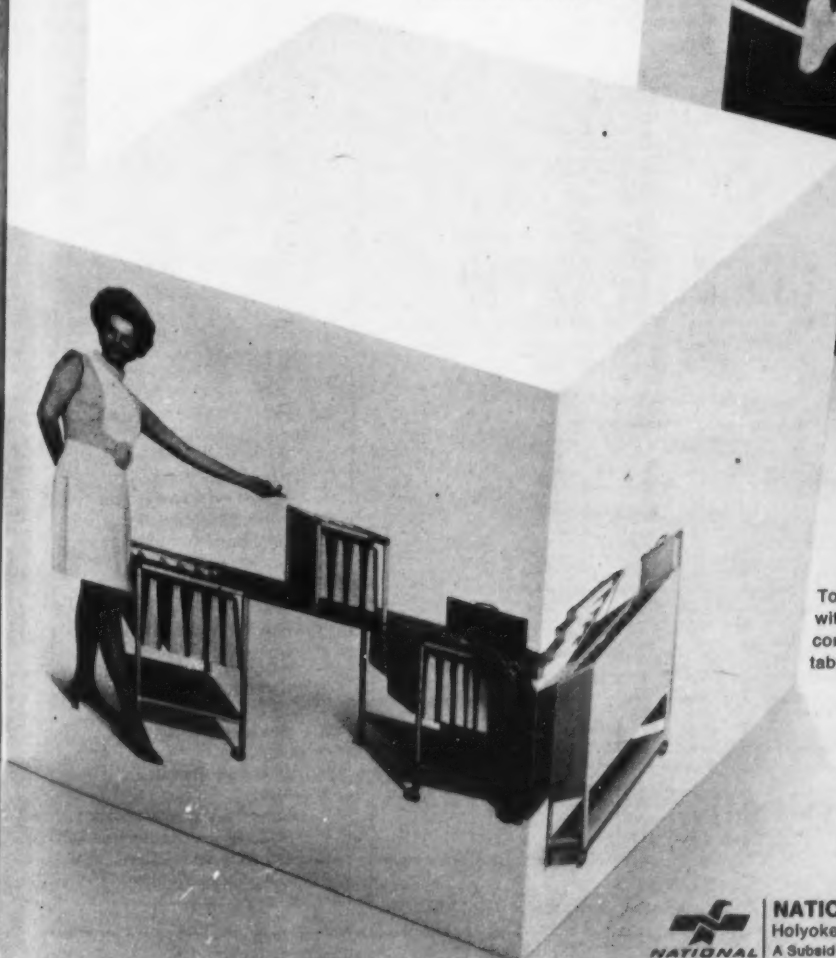
Simplify binding and hanging of burst and unburst print-outs with National Hang-A-Ref(TM) Data Binders. Hook slides out to hold binder in suspension, retracts for carrying and reference.



Top off your complete housing system with handy Control-Rack(TM) units for convenient desk data referral at desk, table or modular stations.



NATIONAL BLANK BOOK COMPANY, INC.  
Holyoke, Massachusetts 01940  
A Subsidiary of Dennison Manufacturing Company



# Reading a yellowed Computerworld again, Charlie?



Get a fresh copy weekly. Subscribe.

Charlie ought to be ashamed. Not just because he's last on the Computerworld routing list. But because Charlie is defeating our whole purpose in life. He's reading old news.

Computerworld was developed to be the fastest, most informative news vehicle in the entire computer field. In fact, we're the most influential publication in our field. And our list of subscribers is growing every day with people who pay us to keep them up to date with the latest industry news, financial news . . . but you know that already. After all, you're reading Computerworld right now.

If you haven't subscribed to Computerworld yet, fill out the coupon below for your own fresh, weekly copy. It'll keep you from reading month old computer news that's gone to the dogs.



## COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

SIXTY AUSTIN STREET, NEWTON, MASSACHUSETTS 02160 • TELEPHONE: (617) 332-8888

Yes, please send me COMPUTERWORLD for . . .

Add \$1.00 per year for Canada; \$4.50 for Foreign

☐ 1 Year \$ 9.00

☐ 3 Years \$20.00

☐ Bill Me

☐ Payment Enclosed

Name	31											48
Your Title	49											56
Co. Name	57											79
Address	15											37
City	38											51 52 53 2 3 STATE
Zip Code	4	8 7 6 7 9	15 16	17 18	19 20	21 22	23 24	25 26	27			

Return to:  
COMPUTERWORLD 60 Austin Street, Newton, Mass. 02160

Please Circle 1 Number  
and 1 Letter:

YOUR TITLE AND/OR  
FUNCTION?

- A. Operational Management (nonengineering)
- B. Computer Professional Staff
- C. Corporate Officers
- D. Engineering Management
- E. Engineering/Scientific
- F. Production/Maintenance
- G. Sales/Marketing
- H. Other \_\_\_\_\_

COMPANY BUSINESS:

- 1. Mining or Construction
- 2. Manufacturer/Computer or Data System
- 3. Manufacturer/Other
- 4. Utility
- 5. Wholesale/Retail
- 6. Finance
- 7. Consultants/DP Services
- 8. Business Service (except DP)
- 9. Educational/Medical/Legal
- 10. Government/Military
- 11. Other \_\_\_\_\_



## Microfilm, Graphical Displays

# Environment, Storage Needs Change Accessory Types

By Peter L. Briggs  
CW Supplement Editor

Recent developments in optical character recognition, microfilm output and input, display systems, new sizes of cards, and the continuing overflow of storage areas with paper and punched cards are slowly bringing about changes in the types of accessories available to support computer installations.

Much more concern for the environment, more interest in eliminating paper production (reportedly the largest expense for many computer installations), and a need to increase efficiency are motivating companies to find better ways to solve old problems.

### Forms Feel Impact

The major impact of this trend is in the area of computer printouts, or forms.

Traditionally, people have felt the need to have a "hard copy" of computer-processed information available on paper and their files. This paper bottleneck is forcing companies to expend large sums on storage, printing, paper, and man-time. No matter how fast companies enlarge their facilities, the sea of paperwork overflows the capacity to handle it.

In recent months, the use of microfilm and graphical displays to displace paper output has begun to be economical, according to many users. The equipment is more available and better known. The prices are more competitive. The psychological conditioning towards paper has begun to break down under the pressure of larger and more complex systems which can produce literally thousands of pages of reports every week.

### Not Dead Yet

From the amounts of continuous forms sold and the amount of specialized equipment sold to assist in handling of printed outputs it is clear that printing is not dead yet, by any means.

Many other reports have indicated the approaching demise of the printed form for use with computers. Though this will probably happen eventually, most users feel that they will remain with a majority of printed reports for at least the next five or six years. Though new technology demands for faster response, and more condensed reports are pushing forms out, that push is very slow and painful.

### Human Environment

The controlled environment for the computer and the health-

ful environment for the computer personnel are getting much attention from smaller specialized firms these days.

A user can now have a company completely design his computer room independently of the rest of his physical facilities. The temperature, humidity, accessibility for maintenance, and traffic flow for computer rooms are of prime importance in designing facilities.

The human environment gets its share of consideration. With the shortage of programmers, the need to have them work efficiently under stress, and the peculiar mixture of the types of work each programmer or analyst must do, careful selec-

tion of the working equipment and decor have become standard features of architectural and interior design for modern buildings and remodeled quarters for computers.

### Microfilm Changes

Microfilm, both as an input and as an output medium, is beginning to be used more widely. The equipment price has dropped considerably (see SJCC coverage), and there is a growing demand for microfilm and support equipment needed to use the film as an archival storage medium.

The high initial investment in readers, copiers, film, and recording equipment slows down

the trend towards changing from forms, but the long-term cost of film is considered to be far lower than that for paper reports, causing many firms to re-examine available equipment for future application.

### Optical Character Recognition

OCR has brought about a whole new field within the data processing accessories business — design, handling, and storage of optically coded and specially designed forms. These documents are generally much smaller than conventional paper forms, nearer the size of punched cards, and are much more fragile than cards.

Large users have indicated that

it will probably require another two or three years before companies are as used to handling scanning documents as they are to handling punched cards. New equipment needs to be developed, and better handling and stacking mechanisms to assist the operator when running a scanner.

Though change is very slow, when compared with the rest of the data processing industry, the accessories market does change. New types of peripherals have been introduced in quantity, such as the disk pack and the tape cartridge.

New types of problems are created and solved — essentially without fuss or bother.



## Join the great tape escape!

With TAPE-MARC\*. The revolutionary, new magnetic tape leasing system that offers you four freedoms:

**Freedom from tied-up capital.** We'll pay you immediate cash for your entire tape library — but you keep the tape!

**Freedom of choice.** We'll replace 25% of your library each year with fresh, new tape — any type, any brand you choose!

**Freedom from costly reruns.** This programmed replacement plan will eliminate worn and error-producing tapes!

**Freedom from cost fluctuation.** One fixed monthly rate lets you manage a smooth, predictable budget year after year!

\* Reg. pending



### LEASEPAC CORPORATION

23945 Mercantile Road • Cleveland, Ohio 44122  
(216) 464-2850 TWX: 810-421-8197

### MAKE YOUR ESCAPE NOW! SEND THIS COUPON.

I want full information on:

- ☐ The new TAPE-MARC Program ☐ Disk Pack Leasing  
☐ Straight Tape Leasing

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Mail to: LEASEPAC CORPORATION  
23945 Mercantile Road, Cleveland, Ohio 44122

### WHAT HAVE YOU DONE FOR YOUR PROGRAMMER LATELY?

Professional programming tools for 3rd generation analysts. Individually personalized and only by mail order from...

HEXCO, Inc. Dept. CC  
P.O. Box 55588  
Houston, Texas 77055  
Send for FREE catalog.

# Why pay more for Graham tape?

## Because the end justifies the means.

Several years ago, we set out to build the finest tape in the computer industry.

It wasn't easy. But we did it.

We built the world's first Zero Defects tape.

We built the world's first million-pass tape — tape that exceeds one million passes on

CDC 680 certifiers, with no permanent errors.

It costs a little more to make a tape like this. But we think it's worth it.

After all, how much did it cost to gather your data? Or write your programs?

How much does your com-

puter time cost? And how much depends on successful completion of your data processing operations?

Can you afford to use any tape but Graham?

 **GRAHAM  
MAGNETICS**

*means to an end.*



Graham, Texas 76046

WATS Phone 800-433-2701

Texas Phone 817-549-3211



May 27, 1970

Page 21

## CDC 955 OCR System Can Read Degraded Print, Copy

MINNEAPOLIS, Minn. — A stand-alone OCR system built around the SC-1700 computer system controller can read degraded print in a large variety of formats, according to the developer, Control Data Corp.

The CDC 955 Page and Document Reader System can read handprint, as well as pages and documents produced by typewriters, high-speed line printers or embossed card imprints. It can also read journal tapes from cash registers, adding and accounting machines, according to CDC.

High resolution optics are said to enable the 955 to read degraded or distorted print found on carbon copies, unevenly spaced or printed computer copy, or poorly inked credit card copies.

The basic system is configured around an 8K SC-1700 with a 1.1  $\mu$ sec cycle time. A 35 KSR Teletype, a magnetic tape controller, and a magnetic tape transport are included. The 37.5 in./sec magnetic tape unit can be had in either 7- or 9-track formats, capable of writing 200, 556, or 800 bit/in. tapes for computer input.

Additional memory, up to 32K, is available. Other options include marking pen, on-line character recognition, mirror-image reading, and the ability to read copy spaced at 6 line/in.

Three line/in. reading is standard. The ability to read handprinting and journal tapes is also optional.

The SC-1700 is used to reformat data and to perform such validation as limit checks, alphabetic or numeric checks, field length, and verification of check digits.

The standard OCR-A character set can be read by the basic system. Several optional sets, including the full OCR-A set with lower case, are available. Other options include the 1428, 1403, 7B, E13B, ISO-B, 12F, NOF and OCR-C fonts.

The handprint character set includes the digits 0 through 9, letters X, T, Z, and the special symbols +, -, and field separator.

The 955 data entry system handles non-intermixed documents that vary in width from 4.875 in. to 11.125 in. and in length from 3.25 in. to 12.875 in. and accepts 18 lb to 38 lb paper.

The read rate of the 955 Page and Document Reader is 750 OCR-A char/sec. This, according to CDC, is equivalent to reading 15 page (8-1/2 in. by 11 in., 30 double-spaced lines)/min, or 14,000 of the smallest permissible one-line document/hr (240/min).

OCR software products for the 955 are Draft (Document Read and Format Translator), Grasp (Generalized Read And Simulate

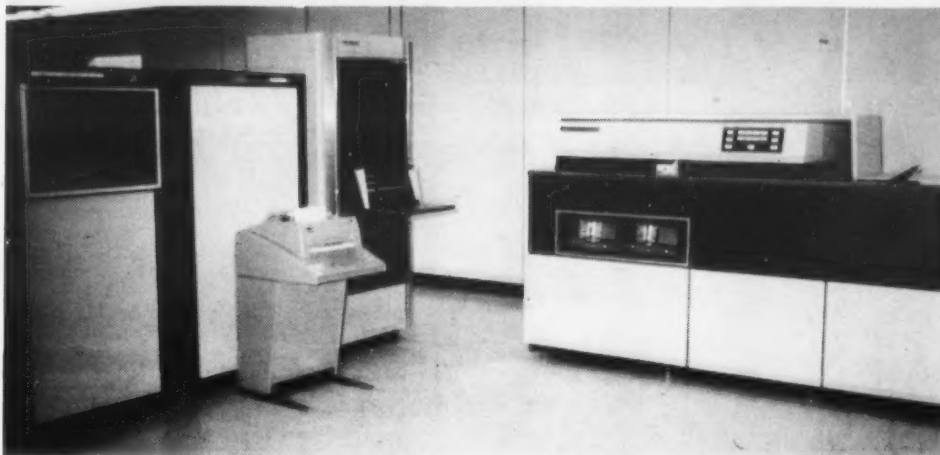
Program), Keypunch Simulator, and List Processor.

Monthly lease prices for the basic 955 Page and Document

Reader is \$5,498, including maintenance. The purchase price for the system is \$197,980 with maintenance costing an addition-

at \$1,160/mo.

Initial customer deliveries are scheduled for July, 1970, on a six- to nine-month schedule.



CDC 955 Page and Document Reading System

## Texas Instruments 980 Mini Performs Scientific and Communications Work

HOUSTON — A general-purpose minicomputer for scientific and communications applications is available from Texas Instruments Inc. (TI).

The minicomputer, the Model 980, was developed by TI for

in-house systems but is now being offered as a stand-alone unit. The 980 minicomputer is a 16-bit machine, with 1  $\mu$ sec memory cycle time, 400 nsec memory access time, basic memory capacity of 4,096 words (expandable in 4K increments to 65,536 words), and design utilizing semiconductor technology.

Eighty-five instructions, including multiply and divide, are used in the stand-alone computer. Software includes a real-time monitor, assembler, and Fortran compiler.

Peripherals optionally available for the 980 computer are a 300 card/min reader, a 120 card/min punch, a 356 line/min printer, paper tape reader and punch, and magnetic tape and disk storage units.

The price for the 980 ranges from \$15,000 to \$17,000. One- and three-year lease-purchase programs are available. The minicomputer is available on 90-day delivery.

The address of Texas Instruments Inc. is P.O. Box 66027.

## Cassette/Tape Recorders Called True Incremental

SUNNYVALE, Calif. — Described by the manufacturer as true incremental devices, a line of three digital cassette/tape recorders has been developed by Mobark Instruments Corp.

Featuring tape handling that is said to be so precise that the tape can be backspaced one character at a time, the recorders are designed to be used with almost any source of digital output.

The inputs to the recorder can include Teletype units, CRT devices, counters, test equipment and digitized process control operations.

The data is recorded on standard, Norelco-type, C-60 cassettes. The cassette has a capacity of 70K blocks of 24 to 32 bits of data, which is recorded at 300 char/sec. Each record is separated by an 18-mil inter-record gap. Recording density is 333 bit/in.

The Series 200 records information with an incremental by data block format, the Series 300 records with an incremental by character format, and the Series 400 features a read/write capability with incremental by character recording.

The recorders are available for serial or parallel I/O in Ascii or BCD codes.

Price of the recorders ranges from \$800 to \$1,600, depending on the options chosen. Delivery is less than 30 days.

Mobark Instruments Corp. is at 1038 W. Evelyn Ave.



Model 980 Minicomputer



Mark V Tape Reader

## Datascan Has Paper Tape Reader for DEC PDP-8I/L

CLIFTON, N.J. — A paper tape reader for the Digital Equipment Corp. PDP-8 I/L minicomputer is available from an independent peripheral manufacturer.

Datascan, Inc. is offering the reader, connecting cable, and an interface card which plugs directly into the computer without modification. The device, called the Mark V data reader, operates at 500 char/sec, whereas the ASR-33 paper tape reader with the PDP-8 computer operates at 10 char/sec.

The Mark V Data Reader is bidirectional and has stop-on-a-

character capability. Options available for the reader include fanfold containers priced at \$75, and a 1,000 char/sec bidirectional spooler priced at \$1,100.

The photoelectric device reads 5-, 6-, 7-, and 8-channel tapes. Interfaces with other small computers can be made available, according to the company.

The Mark V data reader with PDP-8 I/L interface costs \$1,155. The device is available for immediate delivery.

Datascan, Inc. is at 1111 Paulson Ave.

## Magnetic Tape Unit, Controller Suited for Communications Use

NORTH SYRACUSE, N.Y. — An IBM-compatible magnetic tape unit and controller, designed for use as a mass storage device in communication systems, is being offered by Daedalus Computer Products, Inc.

The Model 119 Magnetic Tape Unit and Controller contains a 9-track, 800 bit/in. continuous read/write tape transport. The transport has a maximum reel size of 10.5 in., accommodates 2,400 ft of tape, records data at five in./sec, and has a rewind speed of 96 in./sec.

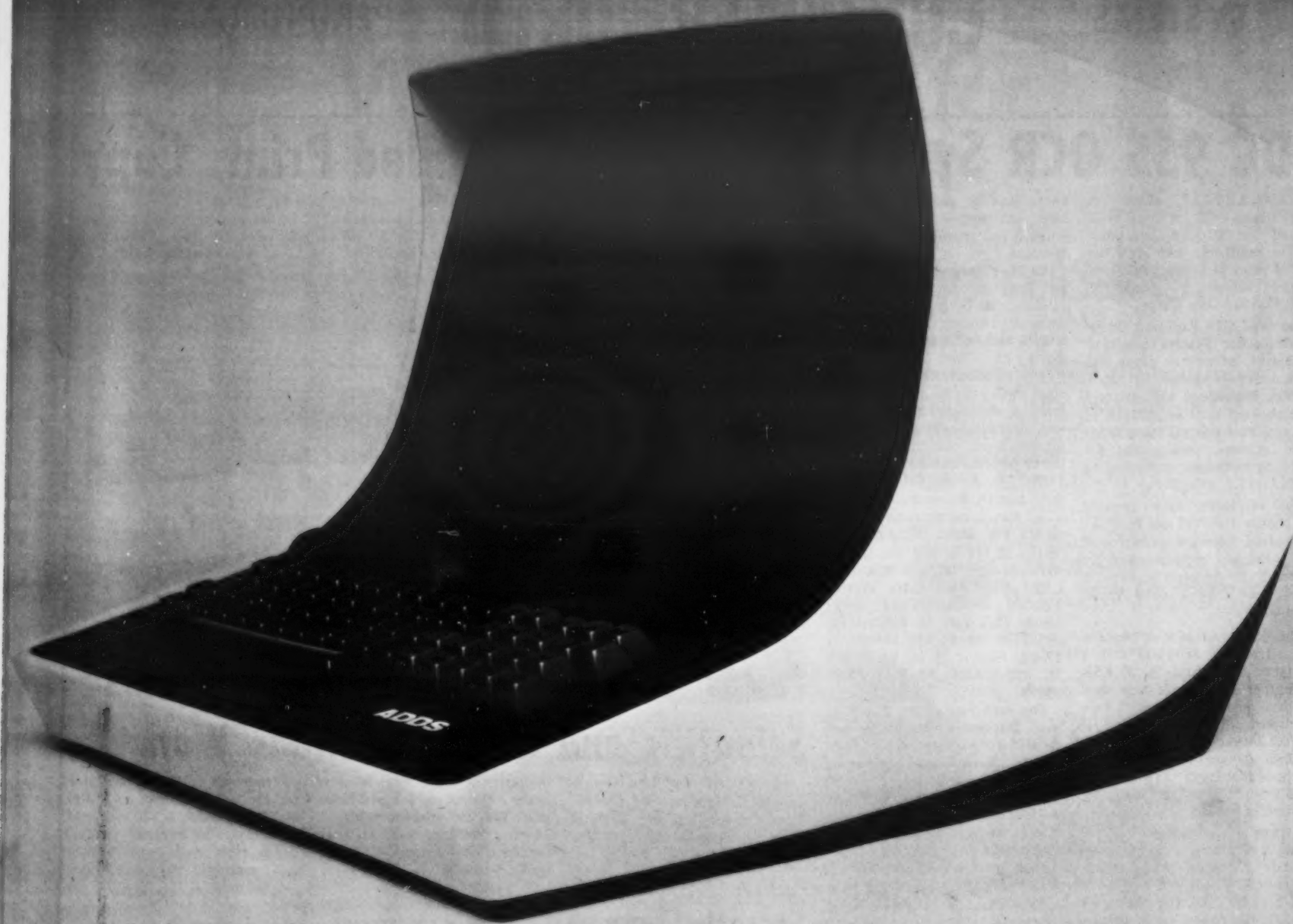
Controller I/O data transfer rate is 450 byte/sec. The con-

troller recognizes and indicates on the control panel three error conditions from the tape transport, and notifies the terminal over the common I/O error line when they occur, the company stated.

The three error conditions are: horizontal parity error (read mode), vertical parity error (read mode), and echo parity error (write mode). Error conditions are cleared by command.

Average purchase price of the Model 119 is under \$12,000. Delivery is 80 days.

Daedalus Computer Products, Inc. is at Box 248.



# The skin-deep part

**The reality of appearance.** A computer terminal is truly beautiful only when it combines aesthetics with fine engineering at the right price.

To arrive at that combination we started with the electronics. We took them right out of our MRD-200 readout display because of its proved reliability.

The keyboard is the same one we use in our portable terminal. It will take a pounding without getting wobbles of the keys.

The 9" TV monitor is a commercial product of long established dependability. We like its reliability and it lets us use standard raster techniques for high character legibility.

We added a built-in acoustic coupler option. The coupler is the best made. It operates over 40 dB attenuated lines in half duplex instead of 30 dB lines like other couplers. We make the coupler ourselves. It operates at 110 and 300 baud.

Then we put all this together in a snug case that lifts up for easy maintenance, added a plexiglas front panel, and we had our terminal.

In fact, we had three terminals, the Consul 800, the 840 and the 880. They display respectively 18 lines of 32 characters, 16 lines of 64 characters, and 20 lines of 80 characters. They cost respectively \$2995, \$3495 and \$3995. And they are all Teletype\* compatible.

**A la mode.** The Consul will operate in three modes, page, message and conversational. The conversational has a special editing sub-mode. When you move the cursor to correct a mistake, the terminal automatically switches to the sub-mode. After retransmitting the corrected line, the terminal automatically switches back to the conversational mode.

In the message and page modes, you can edit several lines or a whole page of data before transmitting it. In both of these modes a

\*Registered trademark of Teletype Corporation





# The beauty part

look ahead feature saves transmission time. It scans ahead and if the rest of a line is blank, the cursor goes directly to the next line.

**Fill in the blanks.** Our terminal also has a formatting feature for fast, efficient data entry. The computer puts up a form, you fill in the blanks with variable data. The tabbing control skips over fixed data and lets you move directly from one variable data field to another. Only variable data is transmitted.

**Thoughts on an Ode on a Grecian Urn.** Making a good computer terminal is a matter of skill, experience and maybe a little luck. You design all sorts of engineering and operating features to make it a better terminal. And, in the end, you have a machine that is not only superb electronic equipment, but a joy to behold.

**ADDS**  
Applied Digital Data Systems Inc.

Mr. Richard Kaufman, Dept. 34  
Applied Digital Data Systems Inc.  
89 Marcus Blvd., Hauppauge, N.Y. 11787 (516) 273-7799

- ☐ Please send me a brochure on the Consul terminal.  
☐ Please have a salesman call me.

Name \_\_\_\_\_  
Title \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

## Three Operating Systems

# Interdata 5 Handles Foreground Background Programs

OCEANPORT, N.J. — Described as a small multitask systems computer, the Interdata Model 5 is designed to handle priority-oriented, process-oriented tasks in the foreground while making available unused processor time for background processing.

The foreground program could be any real-time tasks such as data collection and process control. Model 5 could be used as a front-end communications processor for any IBM 360 or other large-scale system, according to the company. Interfaces are also available for Burroughs B5500, and Univac 1108 systems.

In the background, the system could be used to perform compilations and assemblies, to debug programs, and in a communications system to perform message formatting, file management, and local data processing.

The Interdata Model 5 is run on a time-shared bases. The interrupt-driven executive is usually controlled by firmware in the system's read-only memory. Optionally, an I/O processor is available to relieve the main processor for additional tasks.

Privileged instructions separate the supervising modes and protect an undebugged background program from destroying an operating foreground.

The Model 5 incorporates a 400 nsec microcoded processor whose preprogrammed ROM controls arithmetic and logical functions as well as internal and external mechanisms of data transfer.

The Model 5 has 113 instructions and is compatible with Interdata's Models 3 and 4. Data word lengths can be 8, 16, or 32 bits, with 16 registers provided for use as accumulators. Fifteen of these can also be

used as index registers. Eight floating point registers are also part of the system. Direct addressing up to the maximum system core capacity is used.

Processor I/O is controlled by a multiplexer bus for up to 256 devices. In conjunction with this, identification of up to 256 interrupt levels with automatic vectoring, chaining and queuing is available. Sixteen hardware priorities are provided as standard equipment, expandable in groups of 16.

The 1  $\mu$ sec core memory of the Model 5 is expandable from 8K bytes to 64K bytes in 8K increments. Addressing can be done at the byte (8-bit) or halfword (16-bit) level. The memory bus can accommodate up to eight high-speed direct memory access devices which are coordinated on a priority managed cycle-steal basis.

One of the direct memory access devices is a selector channel which provides high-speed, block-oriented data transfers. After the processor initiates the block transfer, it is free to perform other work. Up to 25 devices can be accommodated by the selector channel.

### Software

Three operating systems are available with the Model 5, Basic Operating System (Boss), Interactive Tape Operating System (Itos), and Real-Time Operating System (Rtos).

Boss controls the I/O for user programs in a device-independent fashion, with the peripherals being assigned at program execution time. It provides for communication with the console operator through a Teletype terminal.

Itos adds tape library manipulation and maintenance to the facilities of Boss.

Rtos is used to schedule and execute programs in a real-time environment. Multiprogramming can be executed at the occurrence of real-time events, specified time intervals, or under operator control. Memory protect and privileged instructions are implemented. Rtos can use a magnetic drum for library storage and for background program roll-out.

A standard Usasi Fortran IV compiler is available. It is a single-pass compiler that requires 16K bytes of memory if run under Boss, 24K bytes if run under Rtos. Compilation speed is 300 card/min, according to Interdata. Run-time libraries provide routines for integer, real, double, complex, and logical data manipulation.

Also offered is an interactive Fortran compiler. A subset of basic Fortran, it needs no operating system and is intended for solving simple problems. All arithmetic processing is done in floating point, the firm said.

Interactive debugging and editing programs can be run on the Model 5. Two symbolic assemblers are provided, one a stand-alone program intended to be used with small hardware configurations, the other intended to be used under Boss or Rtos on larger systems.

### Peripherals

Random access storage is provided by the availability of magnetic drums ranging in capacity from 131K bytes to 8.3 megabytes. Average transfer rates are 230K byte/sec, with 8.7 and 17.4 msec average access times.

Also available is the Mini Disk System with 51.2K bytes of storage per disk. Up to two disks can be operated by one controller. Average access time is 8.5 msec and the transfer rate is 60K byte/sec.

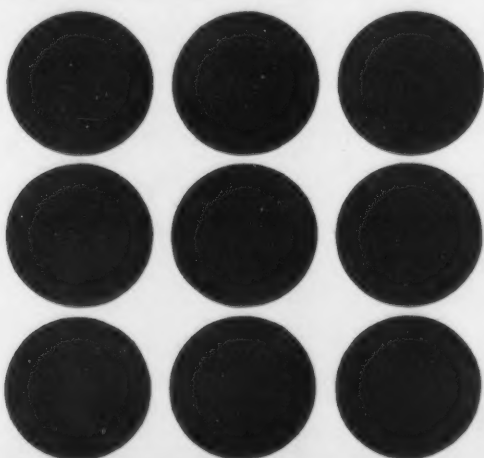
IBM-compatible 7- and 9-track tape transports are available with 25 in./sec speed and densities of 556 and 800 bit/in.

A paper tape reader rated at 300 char/sec and a 60 char/sec paper tape punch can be attached to the Model 5 Fanfold paper tape is used as the software medium for the system, according to Interdata.

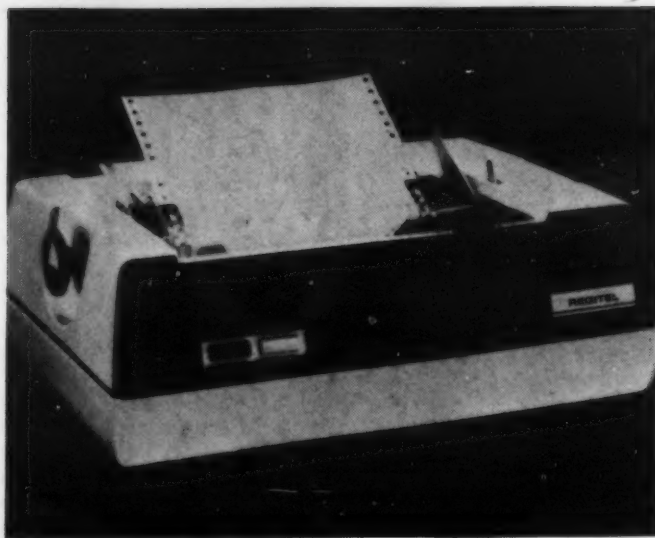
A 300 line/min printer with 132 print positions is available as is a 200 card/min reader. A cassette tape system is said to provide a replacement for paper tape equipment with a transfer rate of 300 char/sec. Each cassette can store 250K bytes.

A basic configuration of the Model 5, consisting of the central processor with 8K bytes of core, an ASR 33 teletypewriter, and Boss software is priced at \$15,600. First deliveries of the Model 5 are scheduled for July, 1970.

Interdata is at 2 Crescent Place, Oceanport, N.J.



Now Regitel  
spells it out for you  
...80 columns wide!



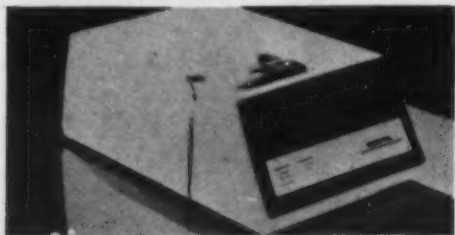
Introducing ... a remarkable new 80-column teleprinter with full alphanumerics. The Regitel 4440-C80 is compact, compatible, low in cost, incomparable in its quiet way.

Plug-for-plug compatible with teletype units, the Regitel 4440-C80 now gives you an important new high-performance, low-cost alternative! It's fast—25 characters per second. It's rugged and reliable. It's fully alphanumeric—all 26 letters of the alphabet, 10 numerics, 8 symbols. Yet its quiet operation fights noise pollution in any environment. Optional pin feed. Order this versatile unit with your choice of three types of electronics...teletype-compatible... RS232B... or bit-parallel, character serial. Prices from \$1600.

REGITEL



Remarkable Data Collection Terminal features full alphanumeric printout, many other advanced Regitel concepts. Low prices—buy, rent or lease.



Remarkable 30 and 40-Column Printers deliver 40 characters per second, quietly, with full alphanumerics. Friction feed or Regitel mini-pin feed.

Mr. N. J. Corolis, National Sales Mgr.  
American Regitel Corp., 870 Industrial Road  
San Carlos, Calif. 94070

Rush full details on the new 4440-C80. I'd also like to know about ☐ 30-col. printer ☐ 40-column printer ☐ data collection terminal. (For immediate information, telephone 415/593-1013)

NAME \_\_\_\_\_

TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_

PHONE \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_

STATE \_\_\_\_\_

ZIP \_\_\_\_\_



# 'Care and Share' Teamwork Reduces Dropout Rate

By Harvey Elman  
CW Staff Writer

ONTARIO, Calif. — An educational innovation at a local high school gives potential dropouts an equal chance to compete for top grades by grouping students via computer into teams which compete for an overall team grade.

Termed "systematic sociometry," or the "Care and Share Program," the idea originated through the efforts of the research counselor at Ontario High School, James D. Randles, who drew upon the results of his own two-year study into the problems of high school dropouts.

"The idea is to give the kid who feels he's going nowhere a chance to succeed," said Randles. "The idea of the 'Care and Share' program is to enable the student to fit into a group — to give him an incentive to stay with a system which he may consider alien."

## Problem: Alienation

"Alienation in the classroom, not in the student, is the problem," he continued. "The potential dropouts were not unhappy, they were making their mark. A dropout is merely a symptom. But does he like the kids he's with? Do his fellow students make school the dropout's bag? In a conventional institutional structure, the student does not require co-operation, he's alone."

The program works as follows:

The students in a Care and Share class fill out a form, indicating the 10 students they admire most, or would most like to work with. The IBM 360 takes this information, and after being mixed with certain other factors, the student's choices are reflected on a printout, showing the ranking of each student in the classroom.

Taking the top students, or "persisters," as "leaders," the 360 then breaks the class down into five or six individual teams

of three or four students each, weighted to make the competition as even as possible.

The teacher then assigns the class a problem which no one student could solve alone. The problem is tackled by the team, with the students working together. Only one grade per team is assigned, with 40% of the final grade being determined by this group grade.

## Teamwork Stressed

The students participating in the program have responded by developing enthusiastic commitments to their teams. School officials said that productivity is up, and absences are down. If a student refuses to work, he pulls down the entire team. When this happens, school officials said, the student almost invariably makes a quick self-evaluation, and comes out of his shell.

"In the dropout study," noted Randles, "we found that the typical high school dropout is not the leather-jacketed type, and they weren't all alienated towards society."

"But, they were alienated towards school and the learning environment because they weren't making a success of it. When they competed against the total class, they always found themselves at the bottom, until they just got to the point of saying, 'Like man, who needs it,' and cut out."

By competing in the team, the slow learner has a chance to draw upon the talents of the other members of the team, and to compete on an equal level with other members of the class. If his team "wins," that is, earns the highest grade in the class, a letter is sent home to the parents of the team members. For many students, it is the first academic recognition they have ever received.

## Group Rotation

Since the group is rotated on an average of once every three weeks, the student gets an opportunity to choose the team-

mates with whom he best works.

Almost without fail, the student also realizes that his success also depends upon how many others select him so he adopts attitudes to cause others to want him on the team.

"This is an important learning process," said Randles. "Man is a social animal. He will associate with some group. And, in later life, the student will associate with larger groups, and by and large, his success will depend on the survival of that group. We feel that these classroom groups

## Education

are a good method for stimulating this commitment towards functioning in society."

The program is also having an effect, school officials felt, on the average student who is encouraged to work harder for much the same reasons as the potential dropout. Overall school grade point averages are up, but especially among the students in the 20 "Care and Share" classes. One class reported a 14% dropout rate last year. This year, there are no dropouts.

School officials also reported a significant improvement in overall student discipline. There has been a 59% drop in the number of students suspended from school this year.

And, surprisingly enough, Randles noted that although the program now involves hundreds

of students, there has not been a single parental complaint about group grading.

## Federal Grant

Financing for the program is by a Title I federal grant under the Elementary and Secondary Education Act, the same source which funded the dropout study.

Randles admitted to cutting a few corners, however. The IBM 360 is rented, and the programmers who put the system together are employees of a Los Angeles-based aerospace firm who are donating their time and talents. The total cost of the program is about \$23,000/yr. So far, a total of 11 volunteer teachers and some 450 students are involved with subjects ranging from English to art and from reading to business.

Almost all students said they felt the program was helping them understand the subject matter better, and stressed the idea that they liked the assignment of grades to the groups, rather than to the individual.

The program has been recommended by District Superintendent Allan Smith, who considered it "a breakthrough in providing the student with self-identity. For the first time, he can begin to understand the importance of education and that learning can be fun."

## Preventative Program

Randles hopes that at least two more schools in the district will adopt similar programs next

year. "This is a successful preventative program to keep potential dropouts in school and our courses are completely accredited for college placement."

Although Ontario High School has a 40% Mexican-American and 8% Negro enrollment, there have been no racial problems in the classrooms. "The only real problem so far," said Randles, "is that the ECSA guidelines state that funding is to be used only for disadvantaged student aid, but we've found that our better students are also improving more than ever before."

"This is the first incursion of the computer into the conventional setting of the classroom to allow for significant decisions by sensitive students," he said.

Lyle Fry, principal of Ontario High School, summed up the program saying:

"Everyone on the team joins to help the individual improve. This is a new experience for some kids. Along with this, the students learn to respect each other for different qualities. They really get to know one another."

## Church Uses Computer

TULSA, Okla. — A Tulsa church will be the first in Oklahoma to employ an EDP system for membership information.

The computer will complete in 10 minutes a task which usually takes one person eight hours a day for two weeks: typing new attendance record cards each year for 1,300 persons in the Sunday school.

*it looks wrong  
but it comes out right  
for Lockheed*

EDP Overtime	36%
EDP Staffing	10%
Late Reports	57%
<hr/>	
\$ 250,000	*
\$ 250,000	1*

## \*\$250,000 Savings using the DEADLINE! Computer Center Planning and Scheduling System.

Late EDP reports, backed-up schedules, and reshuffling of job assignments is a costly proposition. The DEADLINE! software package provides Lockheed-Georgia with a way of scheduling its entire EDP center according to Lockheed's own priorities with efficient time use. Annual cost savings are estimated at \$250,000 . . . in the data center alone. For savings in any size EDP center, contact: Director of Marketing, Synergistic Cybernetics, Inc., 7777 Leesburg Pike, Falls Church, Va. 22043. Phone: (703) 821-2500.

**SCI** SYNERGISTIC  
CYBERNETICS  
INCORPORATED

## Data Processing Center Ready for Immediate Occupancy In Macon, Georgia (85 miles from Atlanta) 70,000 Square Feet



**FOR SALE OR LEASE**

- ☐ This uniquely designed office building completed in 1969 is located on 12 acres—with additional acreage available for future expansion.
- ☐ Specially constructed area for data processing equipment with separate temperature and humidity controls; acoustically treated general office area to minimize noise.
- ☐ Large labor supply is on file ready to work.
- ☐ Banking, housing, postal and salary surveys available.

(Exclusive Agent)

**CROSS BROWN**  
COMPANY

For brochure and complete details  
Contact S. M. Riela, V.P.  
522 Fifth Ave., New York, N.Y. 10036  
(212) 687-9200

# Cal Poly Joins Statewide Problem-Solving Network

By Harvey Elman  
CW Staff Writer

POMONA, Calif. — A newly activated CDC 3150 at California State Polytechnic College stores answers to a wide range of administrative, instructional, and academic problems as part of a \$7-million network linkup of the 19 California state colleges.

Stuart Friedman, director of institutional research at Cal Poly, said the college will now be able to interface its program with the larger system, thus taping itself into statewide data processing and gaining the capability of complex problem solving.

Friedman noted that the college's most complex problems will be fed through the

network to a giant CDC 3300 at Cal State, Los Angeles (CSCLA). The answers will be fed directly back on Cal Poly's 3150.

## Education

James P. Kilroy, ADP manager at Cal Poly, said the 3150 now being leased is 10 times faster than the model previously used. He said it would print out information at 1,000 lines, or 136,000 char/min.

The 3150 will give the school a higher level version of Fortran than is now available, and will bring Cobol to the campus for the first time. Algol, a computer language in foreign countries, will also be available to students, staff, and faculty for the first time.

Marketing students at Cal Poly have already started using the computer to solve field problems. Engineering students

are exploring the 3150's ability to control another machine numerically.

Agricultural business management instructors use the computer to simulate business enterprises and give students on-the-spot job management training. Management programs are fed into the 3150. The feedback tells each student the degree of his or her management success, adequacy, or failure. Other student and classroom programs being run are in data processing, engineering circuit analysis, business administration, economics, and animal science.

Some of the computer's administrative tasks, in addition to its scope of scholastic duties, will be to keep track of all student records, grades, and work completed; to keep cost information current on all physical plant work being done on campus; to maintain a physical inventory of all college supplies; and to process and compute the feasibility of all student class-schedule programs.

## Basic-8 Increases Student CAI Use

MAYNARD, Mass. — First deliveries are now being made of a Digital Equipment Corp. (DEC) low-cost, computer-based education system which increases student participation in computer-assisted instruction.

The system, designated Basic-8, allows students to code data cards with an ordinary pencil and automatically input data to a computer via card reader. It includes either DEC's PDP-8/I or 8/L, optical mark sense card reader, and a disk storage unit. Dartmouth College's popular algebraic language, Basic (Phase I), is used, and is composed of easy-to-learn English statements and mathematical expressions. "Concentrated use of this system will be found mostly in secondary schools," a company spokesman said.

According to educational marketing manager Richard E. May, "It allows an unlimited number of students to develop mathematical problems and then be evaluated by computer via a printout. The system processes more than 200 card/min.

"Instead of having four students per hour using the computer as an instructional device, this number is increased manifold. It also accepts 'hands-on' users automatically, upon completion of data card processing," he added.

Cost of a single terminal system is \$21,550, which includes a PDP-8/L,

4,096 words of core memory, 32,768 words of disk memory, and the card reader. Cost of a larger PDP-8/I, expandable to 16 terminals, is \$24,300.

Basic-8 is designed for use with the Camp (Computer-Assisted Mathematics Program) textbook series, which is published by Scott, Foresman, and Co. The series consists of four instructional texts for high school mathematics.

## Western Airlines goes first class

## Computer 'Discusses' Student Lessons, Grades Essay Tests

COLORADO SPRINGS, Colo. — A computer which can call a student by name, correct misspellings, and even grade essay-type test answers has been unveiled here recently by Sperry Rand Corp.'s Univac Division.

This new system of computer-oriented programmed instruction (Copi) utilizes the Uniscope 300 visual communications terminal connected to an 1108 by telephone lines.

Neither the instructor nor the student is required to have prior knowledge of computers or programming, the company said.

By operating a simple keyboard a student can, within two seconds, see the requested information on a cathode ray tube (CRT). The computer will even address a student by name and "discuss" a lesson which the student may have trouble grasping.

Copi allows the student to progress at his own speed.

### Started in 1966

Original development work on the new system started in 1966. Seminars have been held in Washington, D.C.; San Diego, Calif.; and Colorado Springs, Colo., with more planned in the near future.

According to E.A. Weaver, Univac's western region manager, the system is very flexible. Any subject now taught in military training or public schools, he said, may be taught with the Univac system. Demonstration courses have already been done on such subjects as weather and geology.





# Prison Inmates Study Computer Operation 'on the Job'

SALEM, Ore. — Inmates at Oregon State Penitentiary are using a computer donated by Xerox Corp. to study computer operation in preparation for new careers outside.

An SDS 910, donated about a year and a half ago to the prison, is used to teach interested prisoners computer programming and customer engineering. Classes are held in a special computer room built at the prison.

More than 40 have gone through the eight-hour-a-day course which is being taught in conjunction with Chemeketa Community College here. Volunteer instructors include Conrad Cook and Ray Bunch from Chemeketa who are teaching the programming part of the course; also John Cool and George Arsulich, former XDS computer services executives who are donating their time, are teaching the customer engineering section.

#### Geared to Intellectual

According to Charles E. Keaton, com-

puter program supervisor at the prison, the program is geared to the intellectually inclined rather than to the vocational. "We are trying to get them involved in college work," he said, "so that they can be successful on the outside."

To date, three prisoners have found jobs on the outside. One, who is still technical-

ly an inmate, works days at Oregon State University as an assistant engineer. Another is working as a programmer for the Corrections Division while a third is a programmer at Chemeketa.

The present course is an outgrowth of one which started in 1967 when IBM

donated computers and instructors in a pilot computer program for prisoners at the penitentiary.

Oregon Gov. Thomas McCall said the Xerox-supported program may be expanded to other correctional institutions including those for women and children.

## National Sharedata Designs DP Program for Banks

HOUSTON — A new DP program for the education of bank personnel across the nation is being designed by National Sharedata Corp. for bankers under the auspices of the American Bankers Association.

The ABA Automation Committee has selected National Sharedata, a national computer management and education company, to develop and teach bank systems design and analysis courses under a pilot program.

"Banks now employ approximately 20% of all people involved in DP today," National Sharedata President Daniel B. Stuart noted. "At the same time, new developments in the field are occurring so rapidly that staying abreast of them has become difficult, if not impossible, in many cases."

#### Widening Educational Gap

"Our prime objective is to close this widening educational gap through the

application of bank operational experience in the classroom programs. This will contribute to the increased efficiency and usefulness of bank DP operations."

Stuart said that the recent "unbundling" has focused bank management's attention on the need for specialized education programs of this type. The bank now has a choice of selecting those firms with the greatest expertise in bank operations, as well as systems.

Under this agreement, the ABA will coordinate enrollment and sponsor the program to be offered to all banks in the country. Sharedata will design a curriculum specifically tailored for bank DP needs and provide instructors whose primary experience is in this field. The educational classes offered to banks by the ABA will be held on a regional basis in major metropolitan areas.

#### Nationwide Group

National Sharedata forms a nationwide association of banks, assuming complete management and operational responsibility for the DP functions. It also markets DP services in the local community of each bank under a revenue-sharing plan.

National Sharedata is now processing work for more than 50 banks through three major bank computer centers.

K. Dodd Miles, director of education, said that the firm presently is building a \$2 million National Education Center in Santa Fe, New Mexico, from which it will provide advanced educational programs for its member banks and clients across the nation. The facility is on a 3-1/2 acre site in the center of Santa Fe and includes classrooms, demonstration areas, library, and administrative offices. The center is scheduled to open in September.

## Education

### Varian Opens Training Center

CHEVERLY, Md. — A new East Coast computer training and service center has been opened here by Varian Data Machines, a producer of small computers and data-communications systems.

"Most important," noted Henry Stover, marketing vice-president, "is that the training covers both hardware and software." Demonstration units on permanent display at the center include the Varian 520/i, 620/i, and R-620/i, as well as the 520/DC, data concentrator.

### Commed Gives \$40,000

WASHINGTON, D.C. — Georgetown University's School of Medicine has received a gift valued at over \$40,000 from Computers in Medicine (Commed) of Rockville, Md.

The gift will be used to "demonstrate the feasibility and usefulness of advanced computerized medical services," said Dean John C. Rose of the medical school.

Rose said the funds would be used for the study and evaluation of health systems that may include computerized medical records, multiphasic screening, automated diagnostic procedures, and medical information systems.

# ss with CRT display from Conrac.

#### IT IS EASY TO SEE WHY.

A million dollar public information system has to look like one. That's the kind of thinking which put Conrac aboard Western at Los Angeles International. Their multi-channel system is computerized to keep track of several important activities, including arrivals, departures and baggage disposition. Within the system are eighty Conrac displays. You can find them almost anywhere. At boarding sites. On the ramps. Behind counters. Near claim areas. In the dispatcher's office and crew lounges. Displayed information is always steady, always sharp and clear.

There is a good reason why. Conrac supplies more high performance video equipment for industrial use than any other manufacturer. We make both color and black and white displays in most sizes for single and multi-party viewing devices. We make complete input/output terminals for OEM's. We make video sections for data display terminals. And our monitors are the world standard for both black and white and color television. If you are in the CRT display market, call us. Your customers will thank you.

**CONRAC**  
CORPORATION

600 North Rimsdale, Covina, California 91722.  
Telephone (213) 966-3511



## Session '70 to Open

VANCOUVER, B.C. — Top-flight speakers have been lined up for what promises to be Canada's largest and most important data processing and management sciences conference, Session '70 in Vancouver, June 1-3.

Session '70 is a joint conference of the Canadian Information Processing Society and the Canadian Operational Research Society. This is the first time these two organizations have held a joint national conference.

The program features three parallel sessions, one oriented to the computer, one to operations research and one to computer interaction. The theme is "looking back and looking forward."

Canadian Justice Minister John Turner is the keynote speaker on the opening day. His subject will be "Computers, Privacy and the Law" which will cover the problems of computers and the law in the 1970s.

## Afips Approves AIAA Bid as Constituent Society

MONTVALE, N.J. — The American Institute of Aeronautics and Astronautics, Inc. (AIAA) has joined The American Federation of Information Processing Societies (Afips) as an affiliated society.

According to Dr. Richard I. Tanaka, Afips president, "We are pleased to announce that AIAA's application for membership in Afips was recently approved by the Afips board of directors. AIAA's contributions to the computing field have been highly significant and we are certain that our new relationship will prove mutually beneficial in many areas."

AIAA, with national headquarters at 1290 Avenue of the Americas in New York, is a non-profit scientific and engineering membership society. Its objective is to advance the arts, science, and technology of aeronautics, astronautics and hydronautics. Present membership exceeds 32,000, plus an additional 7,000 student members. Approximately 3,000 full members have a major involvement in

computing and data processing.

In line with its EDP interests, the institute maintains a formal technical committee on computer systems. Among its recent activities, the committee sponsored a special conference last September covering aerospace computer systems. The committee also supports sessions on information processing in connection with a number of the institute's meetings, including its annual meeting.

According to Dr. Ronald Smelt, AIAA

president, Dr. Eugene Levin of Culler/Harrison Inc. has been appointed AIAA representative to Afips and will serve as a member of the federation's board of directors.

Afips, with national headquarters here, is a federation of 11 national societies active in the information processing field. As such, it acts on behalf of over 100,000 individuals involved in the design and/or application of computers and computer technology.

## Jung Urges Scrutiny of EDP Role

NEW YORK — "There is a need for management to compare the role of EDP in their own operations to that of competitors and other industries," declared David C. Jung, of Quantum Science Corp., at the recent Compo West seminar.

Jung pictured a successful computer user as one yardstick for management to assess the cost-effectiveness of its own installation. He said certain aerospace firms spend as much as 4% of annual sales on EDP, while many companies in apparel and fabricated metal industries with sales of \$20 to \$30 million have no EDP.

Quantum Science, an information service company, performs continuing analyses of the EDP industry in a series of large-scale multiclient studies and Maptek seminars.

"EDP is receiving top-management scrutiny now," said Jung. "The potential application benefits far exceed current EDP spending in all industries." Domestic expenditures for EDP reached \$11.6 billion in 1969.

The crucial decision for many companies is to determine if EDP is an asset or a liability as now operated. Detailed EDP planning requires consideration of individual company capabilities and interests.



## Logically speaking... Everybody loves our KeyDisc system. It's so compatible.

It goes together so well with the IBM System/360 and all other major computer systems. Including the RCA Spectra 70, and the Univac 9000 series.

100% compatible... that's Logic's LC-720 KeyDisc Data Input System.

The LC-720's magnetic disc drive is an IBM 2311 compatible unit. Its disc pack is an IBM 1316 that is removable, directly interchangeable and guaranteed readable by your computer system. Output formats include the

disc pack and industry-compatible 7 or 9 track magnetic tape.

And where high-speed input is required, the LC-720 will interface directly with your computer system.

But there are other lovable things about the LC-720 that you'll find completely compatible with your day-to-day operations. For instance, it minimizes errors with point-of-entry editing and correction.

And it offers you total security and high-speed random access of data. However, the thing you'll love most is that it keeps your computer working all the time.

At Logic we think about compatibility a lot. And what a difference it can make to your data collecting.

Lewis Barr at Logic would be happy to show you how. Give him a call. 609-424-3150.

It's the logical thing to do.

## LC-720 KeyDisc System



21 Olney Avenue • Cherry Hill Industrial Park • Cherry Hill, N.J. 08034 • (609) 424-3150

## Calendar

May 26-28, New York — The 11th Annual Symposium & Exhibit of the Society for Information Display with the theme "Information Display Evolution and Advance" (Idea). Contact: William M. Hornish, Western Union, 82 McKee Drive, Mahwah, N.J. 07430.

May 29, Newton, Mass. — The New England Chapters of the Association for Systems Management (ASM) present the 10th Annual New England Systems Seminar. Contact: Mr. Thomas F. Cavanaugh Jr., publicity chairman, Keane Associates, Inc., 36 Washington St., Wellesley, Mass. 02181.

June 2, Washington, D.C. — 8th Spring Systems Seminar with the theme "Systems Management in the Seventies," sponsored by the Washington, D.C. Chapter of the Association for Systems Management. Contact: Washington, D.C. Chapter, Association for Systems Management, 1776 K St., N.W., Washington, D.C. 20006.

June 10-12, Denver, Colo. — 1970 Summer Computer Simulation Conference sponsored by the ACM Share and Simulation Councils, Inc. Contact: Donald Lusty, 1970 SCSC Registration Chairman, c/o Electronic Associates Inc., 2120 So. Ash St., Denver, Colo. 80222.

June 10-12, New York — AMA presents a briefing on Banking and the Computer entitled "Electronic Money." Contact: American Management Association, Inc., AMA Building, 135 West 50th St., New York, N.Y. 10020.

June 15-26, Ann Arbor, Mich. — Summer workshops on "The Use of the Computer in Management Education" presented by the University of Michigan's Graduate School of Business Administration. Contact: Gil Goodwin, University of Michigan News Service, 6014 Administration Building, Ann Arbor, Mich. 48104.



May 27, 1970

Page 29



Sales clerk at Ohrbach's uses newly installed credit authorization system to obtain immediate response for customer's credit purchase.

## Ohrbach's to Lease TRW Credit Approval System

LOS ANGELES — Ohrbach's Inc. will lease and install in its West Coast stores a new credit authorization system, developed and produced by TRW Data Systems Inc.

Thomas Whalen, vice-president of operations, described the new system as offering "advanced" computerized retail credit control.

The TRW Credifier 3200 system is capable of storing and processing customer account records at a central location. Inquiries are made from the store by sales clerks at the point-of-sale via a pushbutton keyboard.

A response in the form of a signal light is registered one second after inquiry.

Whalen listed three advantages Ohrbach's will gain from use of the system: a more rapid and efficient service to credit customers; reduction in credit loss through improved control of charge accounts; and expansion of sales through credit purchases.

TRW Data Systems Inc., Torrance, Calif., is a part of TRW Information Services Inc., specialists in credit card and check cashing authorization systems to banks, supermarkets, and major retailers.

## 'European Super Computer' Meets With French Government Support

By J.H. Bonnett

Special to Computerworld

LONDON — The French government has reacted favorably to the establishment of a "European super computer." Details of a memorandum from French President Georges Pompidou to the Council of Europe reveal general approval of a European "super computer committee," composed of members of the EEC, to hold back the threat from outside Europe.

The memo also suggested that it should be a cooperative venture, and that participating firms should be offered preferential

buying rights. The affairs, it continued, should be put into the hands of a central core of top grade computer specialists with authority to decide who should participate in the research stage, to be financed by central governments.

A report on the "Industrial Policy of the EEC," published by the Council of Europe, noted that Europe had missed out in important markets, and that a group market, perhaps with help from other European countries, is essential if European computing is to succeed.

## ICL Shows Strength in Computer Installations in UK, — 43% in 1968

LONDON — Britain, one of the few nations in which IBM does not have a lion's share of the computer business, has shown that it is possible to challenge U.S. dominance. International Computers Ltd., a company that originated from the government-sponsored merger of a group of ailing British computer manufacturers, had 43% of the installed systems in the UK against IBM's 30%.

In cash terms, however, IBM apparently realizes greater profit despite selling fewer systems. In 1968, the last year for which complete figures are available, IBM (UK) Ltd., the British arm, made a profit of \$82 million on total sales of \$300 million, while ICL turned in only \$14 million on roughly comparable sales of \$278 million.

On the software side, IBM (UK) has partially unbundled and will do so completely in 1972 but without a price reduction. International Computers presently has no intention of unbundling and, in fact, claims to supply much of the applications programming required by its customers.

### Hoskyns Report

According to a recent report published by the Hoskyns Group Ltd. of London, a large software and consulting house, UK users allocate only 1% of their expenditure to software from independent firms. By 1980, Hoskyns expects this figure to reach some 6% (\$300 million). The speed of software development appears to be slower than in the U.S. Reported Hoskyns: "... it still takes eight to 10 years from the initial development of a new application system to its general availability for UK users." For U.S. users this delay is probably around six years.

Reliability of software and shortages of experienced personnel also appear to plague British users. The Hoskyns report noted that quality control and rigorous testing schemes are only just beginning to be applied to software packages. The personnel shortages appear to result from the refusal or the inability of most users to train entrants to the industry rather than any shortage of qualified applicants.

### 360 Competition

As might be expected from a company with a larger share of the British market than IBM, International Computers Ltd. offers a line of systems to compete directly with the 360 series. However, because of the hybrid parentage of ICL, the company offers two distinct types of systems, the 1900 and 4210 series, based on 24-bit, word-oriented machines and finding wide acceptance among both business and scientific users.

IBM markets the full range of its U.S.-developed systems in the UK although indications are unclear as to which systems sell

best in a market where fewer companies can afford to experiment with complex multiprogramming or time-sharing systems. After IBM, Honeywell has been the most successful other U.S. manufacturer in the UK with some 6% of the market last year.

Both Honeywell and NCR have extensive manufacturing facilities in the UK. Of the other U.S. mainframe manufacturers, Burroughs has been successful in selling terminal systems to British banks and has a contract to supply a large consortium with an on-line system for several thousand bank branches.

A few minicomputer manufacturers have appeared to compete with Digital Equipment (UK) Ltd., which is as predominant in its field in the UK as the parent DEC is in the U.S. The most active of the new entrepreneurs is Modular Technology, Ltd.,

which makes a small modular computer whose units are connected by a high-speed data highway.

### Faster UK Growth Rate

Although the UK computer business is considerably smaller and less developed than that of the U.S., the UK business is expected to grow at a faster rate. According to the Hoskyns report, the average annual growth in the next decade will be 14% or 15% which contrasts with an estimated 12% average annual growth for the U.S.

By 1980, UK expenditure on data processing will approach \$6 billion annually, or less than one-tenth that of the U.S. As in the U.S., much of this growth is likely to occur in the service area. Software houses and remote access services are expected to show the highest growth rates, the report noted.

## Univac Restructure Has New Operating Groups

BLUE BELL, Pa. — A new organizational structure for the worldwide operations of Univac has been announced by Robert E. McDonald, president of Univac.

McDonald said that Univac has established two primary operational units to meet challenges of the world market. The new operating groups, which consolidate the functions of three profit centers, are the worldwide marketing and services organization and the worldwide development and manufacturing organization.

George H. Geick and Gerald G. Probst have been promoted to executive vice-presidents of Univac, McDonald stated. Geick will head worldwide marketing and services. Probst will head worldwide development and manufacturing.

Geick was formerly vice-president and general manager of the International Division. Probst was formerly vice-president and general manager of the data

processing division.

"The new organizational structure will enable Univac to meet the rapidly expanding opportunities and challenge of the global computer market with maximum efficiency," McDonald said. He pointed out that about 30% of Univac's sales in 1969 were to customers outside the U.S.

"We have discerned many changes in the nature of our business, characteristics of the competition, markets, and customer requirements. Above all, we have determined that we must think and function on a worldwide scale. As a result, our organization must, in every respect, be designed to service the worldwide marketplace for computer systems and services," he said.

"We have just concluded the most successful year in our history," he added, "and we are embarking on what appears to be another period of growth and expansion."

## West Germany EDP Investment May Be Nearly \$2.5 Billion by 1975

By M.W. Martin

Special to Computerworld

BONN — Surveys indicate that West Germany is presently "computerizing" its economy at a faster rate than the U.S.

In 1968 there were 4,000 computers in the Federal Republic of Germany. By 1975 it is estimated some 12,000 of the electronic brains will have been installed. That will represent an investment of about \$2.5 billion.

From 1949 to 1968 the total of electronic computers at work in West Germany (with West Berlin) multiplied 41 times.

The German Federal Government plans to computerize several of its information-gathering operations. There will be data banks and other aspects of an electronic-computer system in these areas:

- Gathering of political information from communications media, for the Federal Press and Information Office.
- A data bank for legal and juristic information.
- An integrated system for the Bonn Government's Budgetary Divisions, treasury, and accounting offices.



## Applied Dynamics to Build New Plant

CLEVELAND — A \$1.4 million, 80,000-sq-ft facility for Applied Dynamics Computer Systems Division of Reliance Electric Co. will be built in Saline, Mich. The plant will give Applied Dynamics the capacity to expand existing product lines and add new products.

Applied Dynamics presently operates three plants in Ann Arbor, Mich. It designs and manufactures computers and analog/hybrid systems. Under development are a system on integrated modules for simplifying the interfacing of industrial processes with the computer, and a system for gas emission analysis for automobile pollution control.

### Other Expansions

Photo Magnetic Systems, Inc. is moving its telephone-computer firm's corporate and national sales offices to 134 So. LaSalle St., Chicago. Photo Magnetic Systems' operations headquarters will remain in Beltsville, Md., near Washington, D.C. The move of corporate and sales facilities to Chicago will give Photo Magnetic Systems a central base for a major national Comput-A-Phone sales program.

General Computer Systems Inc., Dallas-based manufacturer of computer data entry systems, has opened sales offices in New York and suburban Detroit.

Barron Data Systems, Inc., Toledo, Mich., is expanding its office facilities in Toledo and extending its services to Adrian and other communities in southern Michigan and northwestern Ohio. The new facilities at 5810 Monroe St. in nearby Sylvania will allow the firm to provide computer services to businessmen.

SCM-Allied/Ergy Business Systems has made plans to double the size of its Denison, Texas plant. The expansion includes construction of a 34,000-sq-ft addition to the present building. The company produces long-run continuous stock and custom forms used on high-speed computer printers in data control centers.

Ampex Corp. of Culver City, Calif., has established a new cus-

tomers service site in Austin, Texas for its Computer Products Division. The Ampex Austin office is at 1615 East Woodward.

TDK Electronics Corp. has moved its West Coast headquarters to the Matrix Building, 931 South Douglas St., El Segundo, Calif. The new quarters

## Expansions

provide facilities for an expanded administration department, regional sales and service as well as expanded warehouse facilities.

Oprex Inc., Menlo Park, Calif., a subsidiary of Kleer-Vu Industries, Inc., has moved to a new plant in a leased building at 3923 Bohannon Drive in Menlo Park's Bohannon Industrial Park. With 14,500-sq-ft of space the firm has tripled its plant facilities in the move.

Intel Corp. of Mountain View, Calif., has started a major building program at Coffin Road and Central Expressway in Santa Clara, Calif. The first 80,000-sq-ft structure will supplement Intel's present 24,000-sq-ft manufacturing plant at 365 Middlefield Road in Mountain View.

Computer Transceiver Systems Inc., has leased a 41,000-sq-ft office and assembly facility on Route 17 in Paramus, N.J.

General Computer Systems, Inc., Dallas-based manufacturer of computer data entry systems, has opened a sales office at 17200 W. Ten Mill Road in Southfield, Mich.

SMC Computer Services, Inc., Dallas, announced the official opening of its new branch office at 1017 Pennsylvania Ave., Ft. Worth, Tex.

Information Standards, Inc., a New York City-based EDP services company, has extended the availability of its Infogen services across the U.S. by designing, generating, and maintaining tailored operating systems through the mail.

Data Products Corp. of Wood-

land Hills, Calif., has opened a branch marketing office for its Systems Division in Rochester, N.Y. The new office is located at 474 Thurston Road in the Six-In-One Building.

Central Computer Corp., Anaheim, Calif., plans to construct a 28,000-sq-ft corporate headquarters and data processing facility in the Irvine Industrial Complex, Santa Ana. The new building will house the company's computer activities and serve as production center for a line of audio-visual "learning booths" produced for it educational division, the Institute of Advanced Technology.

Data Motivation Inc., a 10-month-old marketing management and product planning consulting firm specializing in computer products, plans to open offices in Chicago and Los Angeles. The company also plans to expand its consulting services into the industrial process control area, providing a product planning service to manufacturers of data collection devices.

Total Package Systems Corp. of Los Angeles has activated a second operating division, Health Care Computer Systems, to offer to the national health care industry a totally integrated system of modular software packages written to be compatible with most existing equipment.

Solonix Inc. has opened a corporate office at 2001 Beverly Blvd., Los Angeles, Calif. Solonix Inc. is engaged in manufacturing electronic components for government and private industry.

Datadial Systems, Inc., formerly at 496 Smithtown Bypass, Smithtown, N.Y., has moved into a new building at 250 Marcus Blvd., Hauppauge, N.Y., to accommodate expanded business activity. Datadial is engaged in providing independent insurance agents and brokers with a comprehensive remote data terminal computer service.

Varian Data Machines has opened a new facility at 113 Twin Oaks Drive, Syracuse, N.Y. Staffed by senior technical and sales personnel, the new facility will offer both sales and service to the northern New York area.

Applied Cybernetics Corp., a California-based information sciences firm with facilities in Sunnyvale, San Francisco, and Los Angeles, is opening its first office in Honolulu.

## Orders and Installations

Valued at \$2 million, a Univac 1106 system has been ordered by Rheinische Braunkohlenwerke A.G. of Cologne, West Germany. The computer will be used for an analysis of the profitability of the company's mining operations. In addition, the Univac 1106 will process engineering operations and analyze aerial photograph measurements.

Petroleos Mexicanos, Mexico's government-owned petroleum company, has ordered three Control Data Corp. 3400 computer systems as the first phase of its plan to provide business and seismic data processing services at its oil fields throughout the Republic. Lurgi, of Frankfurt, Germany, has installed a Control Data 3300 to solve engineering problems and facilitate the design and construction of plants and equipment on a worldwide basis. A third company, Bell Telephone Co. of Canada, Ltd., has recently ordered a 6400 valued at nearly \$2 million to be used in forecasting future telephone network requirements, communications research projects, and the analysis of communications simulation models.

Ampex Corp. has begun delivery of Model TM-16200 digital tape drives to Computer Micro-Image Systems, Inc. (CMS), Northridge, Calif. under a \$100,000 contract. The TM-16200s will be used with the CMS-7000 series computer output micro-image system.

Data Recording Instrument Co. Ltd. of Staines has received an order valued at more than \$1.2 million for the supply of its Type SC.1030 magnetic tape handlers to Nixdorf Computer in Germany.

Delta Data Systems, Kensington, Md., delivered its proprietary accounts receivable system to Citizens Trust Co., Providence, R.I. Citizens Trust will use the Delta accounts receivable system in its customer services operation.

Data Recognition Corp., Palo Alto, Calif., has received a \$320,000 order for four DRC 700 optical scanner/encoders from the Western States Bankcard Association (WSBA). The equipment will be used in the association's San Francisco processing center to improve the

speed and accuracy of transferring customer account numbers from credit card sales slips into machine readable language.

Bolt Beranek and Newman Inc. (BBN) has received orders for nine of its interface message processors. Deliveries have been made to UCLA; Stanford Research Institute; the University of Calif. at Santa Barbara; MIT; the University of Utah; BBN's Cambridge Research Center; the Rand Corp.; Systems Development Corp. at Santa Monica, Calif.; and the Advanced Research Projects Agency of the Department of Defense.

The South African Council for Scientific and Industrial Research, Republic of South Africa, has installed a Control Data 1700 system to act as a data acquisition and display system.

Tri-Data Corp., Mountain View, Calif., has received a \$750,000 order from Teradyne, Inc., Boston, for Cartrifile magnetic tape units used for program storage and data logging in computer-controlled, integrated circuit, and other transistor test systems.

Graphic Controls Corp., Buffalo, N.Y., is installing a new PDP-10 system to meet the rapidly expanding market for remote terminal computing services.

A GE-615 information system will soon be installed in the Skokie, Ill., headquarter offices of G.D. Searle & Co. Commercial and scientific applications are scheduled.

Hewlett-Packard Co. in Cupertino, Calif., has ordered \$600,000 worth of miniprinters from Data Products Corp. of Los Angeles, for use in Hewlett-Packard's line of digital computers.

An IBM System/3 has been installed at Carleton Stuart Inc., a distributor of Carrier air conditioners. Initially, the firm will use the new computer to process accounts receivable. Later, its uses will be extended to inventory control, payroll, and accounts payable.

The State University at Binghamton, N.Y., is installing an IBM 360/67 system to replace a 360/40 now in use in its computer center.

A \$5.2 million Univac 1108 multiprocessor system has been purchased by Huettenwerk Oberhausen AG (Hoag), Oberhausen, West Germany, to be used for a plant-wide, real-time information system. Interdata S.A. of Spain has ordered a Univac 1106, valued at \$1.5 million, to be used for statistical studies concerning the chemical and pharmaceutical markets. Orders are in from United Airlines for three Univac 1108 multiprocessor systems, including peripheral and remote devices. The equipment will be utilized for a variety of applications including message switching, material control, flight information, and flight planning.

## DYNAMIC DEBUGGING SYSTEM

### ASYST

- Receives control at program check or external interrupt.
- Operates in full Batch, MPS, or BJT environment.
- User may alter or display any register, storage or PSW.
- Built in Hex address calculator.



INTERNATIONAL LOGIC CORPORATION

BOSTON • SAN FRANCISCO • LOS ANGELES • TOKYO

## Equipment For Sale

### TELETYPES

33 ASR MODEL TBE

IMMEDIATE DELIVERY

\$788

ANY QUANTITY

BRAND NEW IN ORIGINAL BOXES

PHONE (301) 948-2446



## World Systems Names 2 Vice-Presidents

BETHESDA, Md. — World Systems Laboratories, Inc. has appointed D.F. Boyd as vice-president of corporate and industrial relations and Belur K. Radhakrishnan as vice-president of systems and operations research.

Prior to his appointment, Boyd was director of corporate and industrial applications. Before joining World Systems, he was manager of operational modeling for IBM's Advanced Systems Development Division. In this capacity he was responsible for planning systems and related computer-based models for policy formulation and program evaluation tailored to meet the needs of industrial management.

Previously, he served as management adviser for Standard Oil Co., N.J., and its affiliates. For three years he was secretary of the financial committee of the Standard Oil subsidiary, Creole Petroleum Co. in Venezuela.

Radhakrishnan has been director of operations research and computer systems. Previously, as director of operations research and scientific analysis for the William C. Allen Corp., Radhakrishnan directed the development of a variety of socioeconomic simulation models.

He was the technical project manager for the Federal Information Center of the Office of Economic Opportunity, where he was responsible for the design and development of integrated data management systems. He performed data analyses for Project Head Start, provided statistical analytical support for Vista, and carried out work in sampling and demographic classification.

Earlier, he served as senior staff scientist for George Washington University, where he developed a

variety of statistical programs and computer simulation models. He was also responsible for compiler development and software evaluation.

Radhakrishnan has also served as assistant research mathematician at the University of Michigan; a research assistant at the Kettering Laboratories, University of Cincinnati; and as a time study engineer for Telco. Jamshepur, India.

### Executive Corner

#### Other Moves

■ Qatron Corp., Rockville, Md., has promoted R. Kent White to president of the Products Division.

■ James E. Still Jr. has been named executive vice-president and chief operating officer of Butler Data Systems, Hawthorne, Calif.

■ Pharos Systems Inc., Bethesda, Md., has appointed William H. Russell to the position of president and chairman of the board.

■ Walker G. Stone has been named vice-president of Becher and Hayes, Inc., Bethesda, Md., a John Wiley & Sons, Inc. subsidiary.

■ Clifford W. Williams, president of TransCom, Inc., has been named corporate vice-president of Hi-G, Inc., Windsor Locks, Conn., the parent company of Transcom.

■ S. Sim Kessler has been elected president of Scientific Literature Corp., Philadelphia, a wholly owned subsidiary of 3i.

■ William F. Glavin has been appointed executive vice-presi-

dent of Xerox Data Systems, El Segundo, Calif.

■ Norman L. Stone has joined Interface Industries, Inc., Hauppauge, N.Y., as vice-president of engineering.

■ John L. Edwards has been named vice-president and treasurer of Athena Systems, Inc.

■ Frederick E. McNabb Jr. has been named vice-president of International Computer Management, New York.

■ Joseph L. Cortellini has been elected a vice-president of the Maxson Electronics Corp., a Riker-Maxson subsidiary.

■ Albert H. Bieser has been named president of General Computer Systems, Inc., Dallas.

■ Edward A. Elliot has been named vice-president and general manager of Medical Microfilming Systems, Detroit.

■ Albert E. Linden has joined Optimax, Inc., Colmar, Pa., as vice-president of the firm's Advanced Microelectronics Division.

■ Francis J. Michel has been appointed vice-president of engineering for Mathatronics of Pennsylvania Inc.

## Director Recap

Gilbert E. Jones has been elected chairman of the board of IBM World Trade Corp. Jones is a member of the board, senior vice-president and chairman of the management committee of International Business Machines Corp., the parent company of IBM World Trade.

Infoton, Inc., Burlington, Mass., has elected to its board of directors Dr. Donald B. Brick, president, and vice-presidents Morton Galper, Dr. Victor S. Levadi, and George G. Pick.

Vincent A. Tauber, president of the management consulting firm of V.A.T. and Associates, New Canaan, Conn., has also been elected to the board of directors.

Walter T. Margetts Jr., president and treasurer of the Hudson and Manhattan Corp., has been elected to the board of directors of Automatic Data Processing, Inc.

Nelson Merritt, vice-president, was elected a member of the board of directors of Brogan Associates, Inc., Westbury, N.Y.

Alva R. Reimers, chairman of the board of directors of Balmar Reprographics, Inc., and William O. Flanagan Jr., vice-president of

Wheat & Co., Inc., have been elected to the board of directors of Synergistic Cybernetics, Inc., Falls Church, Va.

Carl W. Stursberg Jr., a partner of American Science Associates, Inc., New York, has been elected to the board of directors of Decision Data Corp., Warminster, Pa.

William P. Dingsdale was elected to the board of directors of Midtex, Inc., Minneapolis. He is presently vice-president of Midtex and president of Western Magnetics, Inc., Glendale, Calif., a subsidiary of Midtex.

James F. McGill has been elected to the board of directors of Executive Relocation, Inc., Wellesley Hills, Mass., where he is vice-president of national operations.

Millard H. Pryor Jr., president of Singer Information Services Co. and a vice-president of the Singer Co., was elected to the board of directors of Time Share Corp., Hanover, N.H.

Thornton F. Bradshaw, president and member of the board of Atlantic Richfield Co., has been elected to the board of directors of Diebold Venture Capital Corp., New York.

## Land Titles Kept Current by Computer

CHICAGO — Chicago Title and Trust Co. is using a computer to analyze the histories of 1.3 million parcels of land in Cook County.

The system researches vast reference files and processes new data affecting title status to keep the files current, and prints portions of title insurance policies. Edward N. Grskovich, vice-president, management systems, said "faster processing is an important advantage. But, the major benefit of the program is greater accuracy through one-time handling of data."

"With the computer system, we can be reasonably certain that information entered accurately will subsequently be reproduced accurately."

The system accepts data from IBM 2260 visual display terminals. CRT operators enter the information through the terminal's keyboard and edit the data on the unit's TV-like screen before transmitting it to the computer.

The reference files include record of taxes, special assessments,

court judgments and a miscellaneous record identifying probate or other legal activity which could affect title to land.

Under the computer-based approach, data is reproduced as needed for title examination and policy printout, maintaining its initial accuracy.

Grskovich added that the new system has not only adapted to, but also helped improve the concept of individual examining units, each operating as a "little title company" for specific groups of customers.

A typical examining unit includes a staff of 10 plus three display terminals. Seven such units are now operating.

Beginning with receipt of a customer order for title search, the examining unit assigns a project number to the order and forwards it to the tract book department where a CRT operator at a display terminal enters the legal description of the property in question.

The clerk can abbreviate the description and subsequently the

computer will expand the abbreviated form so that the description will be written out in full on policy documents.

From this initial entry, the system prepares a multicarbond search form which is circulated with a project file to appropriate departments within the title division, according to Raymond H. Brinkman, vice-president, management systems.

Each department makes inquiries of the computer-stored records pertinent to its area of interest and on the following day receives a printout of any exceptions to title which may exist.

An on-site inspection report completes the information profile required by the examiner. When all search forms are complete, the project file is delivered to the appropriate examining unit for final disposition.

Brinkman said the display terminals are linked to one of two 360/40 computers which retrieve reference information from storage on magnetic strips in a large-capacity data cell.

## James L. Hollis Dies in Maryland, Chairman of the Board of Rixon

SILVER SPRING, Md. — James L. Hollis, chairman of the board of Rixon Electronics, Inc., died April 22, 1970, following surgery. He was 54.

He had been associated with Rixon since 1954 and became president and chairman of the company in 1957. Prior to being with Rixon, Mr. Hollis held executive positions with Crosley Corp. WLW, Cincinnati; Collins Radio Corp., and Page Communications Engineers, Inc.

Mr. Hollis was active in community, civic, and professional affairs. He graduated from Kansas State University in 1938 with a B.S. in engineering and was a registered professional engineer and a senior member of the Institute of Electrical and Electronics Engineers.

He is survived by his wife, Wilma Draper Hollis, and four children; Philip D. Hollis, Ardith J. Roddy, Barbara K. Hollis, Donna R. Hudson, and one grandchild, Richard Roddy Jr.

### SYSTEMS AND INFORMATION DIRECTOR City of Fort Collins, Colorado

Rapidly growing university community (43,000). Front door beautiful Rocky Mountains. Excellent fringe benefits and work environment in progress oriented organization. Salary commensurate for person with complete EDP and systems background. Minimum 3-5 years experience plus degree. Contact Assistant City Manager, Municipal Building. 80521.

### Position Announcements

#### Wanted Moonlighters

COBOL Programmers  
N.Y.C. Area

Need to convert  
IBM 360/20 card  
RPG program to  
IBM 360/30 system

Send qualifications and resume

CW Box 3199  
60 Austin St.  
Newtonville, Mass.

## EDP PROFESSIONALS:

Q. Why can't Aetna Life & Casualty use a single 360/65?

A. Because we need at least four Mod 65's (with O/S — MVT) and a Mod 67 to keep up with the work load now. And eight 360/30's plus all kinds of direct access, I/O and telecommunications gear.

If you have programming or analysis experience, it's worth your while to find out what Aetna has to offer. Phone 273-3351 or send your resume to M. A. Cicalone, Personnel Dept., Aetna Life & Casualty, Hartford, Conn. 06115. An equal opportunity employer and a JOBS-participating company.

**Aetna**  
LIFE & CASUALTY

## Contracts

Information & Communications Applications, Inc. has been awarded a \$47,500 contract by the Space and Missile Systems Organization of the Air Force to develop new approaches to computer hardware design.

The Ontario Government concluded a contract for a Univac 1106 to be used in the Ontario Computer Services Center.

Computing and Software, Inc. received a one-year contract valued in excess of \$4.9 million from the National Aeronautics and Space Administration for continuation of data processing services at the Goddard Space Flight Center, Greenbelt, Md.

Metropolitan Pathology Labs Inc. has contracted to rent three small-scale computers from Honeywell's EDP Division. The 125s will interface with a tape system which receives data from two AGA autochemists, a machine which performs 21 chemical tests on blood samples. Each autochemist is capable of screening 135 patients an hour. This is the first time a computer will be

used with an autochemist to print reports, collate and separate normal from abnormal results.

The Comsonic Corp. has received a contract from Metropolitan Pathology Labs, Inc. for the design and assembly of a communications interface which will provide Met-Path with the capability of printing its reports remotely.

Collins Radio Co. has signed an MOS/LSI teleproduction agreement with Viatron Computer Systems, Inc., of Bedford, Mass., for the supply of read-only-memory arrays (ROM), each containing 2048 bits. High volume teleproduction has begun seven individual array designs for Viatron's Systems 21 now in mass production. The ROM order exceeds \$1 million.

Sanders Associates, Inc. has been awarded a \$4.2 million Navy contract for classified electronic components.

## COMPUTERWORLD's Sales Offices

**National Sales Manager**  
Neal Wilder  
**Sales Administrator:**  
Dorothy Travis  
COMPUTERWORLD  
797 Washington Street  
Newton, Mass. 02160  
(617) 332-5606

**New England Regional Manager**  
Robert Ziegel  
COMPUTERWORLD  
797 Washington Street  
Newton, Mass. 02160  
(617) 332-5606

**Mid. Atlantic Regional Manager**  
Donald E. Fagan  
**Phila. - Wash., D.C. District Manager**  
John Cummings  
COMPUTERWORLD  
Suite 4C  
120 East 34th Street  
New York, N.Y. 10016  
(212) 532-1790

**Midwest Regional Manager**  
Bill Farrell  
**Eastern Midwest District Manager**  
Joe Daniels  
COMPUTERWORLD  
Suite 218  
25 East Chestnut  
Chicago, Illinois 60611  
(312) 944-5885

**Southeast Regional Manager**  
Ed Graham  
COMPUTERWORLD  
Stemmons Tower West  
2730 Stemmons Freeway  
Dallas, Texas 75207  
(214) 638-1140

**Los Angeles Area:**  
Bob Byrne  
Sherwood/Byrne/Clarkson/  
Van & Assoc.  
1017 N. LaCienega Blvd.  
Los Angeles, Calif. 90069  
(213) 657-6221

**San Francisco Area:**  
Bill Healey  
Thompson/Healey Assoc.  
1111 Hearst Bldg.  
San Francisco, Calif. 94103  
(415) 362-8547

**Japan:**  
Mr. Naoyoshi Ando  
Fuji Corporation  
3-1, 5-Chome Yoyogi  
Shibuya-Ku  
Tokyo, Japan

## Buy Sell Swap

### RCA SPECTRA 70/45F FOR SALE or LEASE

-131K  
-12 TAPES  
-3 DISKS

Write: Scott C. Calahan  
The General Tire and  
Rubber Company  
1 General Street  
Akron, Ohio 44309  
Or Call: 216-798-3316

### SALE

Sanders Data  
Display Equipment

(2) 720 Display Terminals  
(1) 701 Control Unit  
Used only on a test basis  
Will Sell June 15  
For Highest Offer Received

TELECOMPUTING  
INCORPORATED  
1626 EDISON STREET  
DALLAS, TEXAS 75207  
(214) 748-0751

### FOR SALE

IBM 2702 Model 1  
Transmission Control Unit  
3233 Data Set Line Adapter  
4612 Line Adapter  
4615 Terminal Control  
2841 Model 1 Storage Control  
2311 Model 1 Disk Drive (2)  
On IBM Maintenance  
Available June 1, 1970

**WANTED TO PURCHASE**  
IBM 360/30 Compatibility  
Features 4456 and 4463  
Write CW Box 3200  
60 Austin Street  
Newton, Mass. 02160

### FOR SALE OR LEASE

360/30  
1406 II  
1401's  
7010-1410  
2311  
1440  
729's

CORPORATE  
COMPUTERS, INC.  
120 East 23rd Street  
New York, N.Y. 10010  
(212) 867-0664

### IBM SALE

024-\$600; 026-\$1800; 056-\$650  
077-\$900; 082-\$1000; 083-\$3800  
084-\$7500; 108-\$7500; 402-\$2000  
403-\$2500; 407-\$7000; 514-\$1900  
519-\$2200; 523-\$1100; 632-\$2500  
1316 Disk Packs \$150;  
2311-\$14,000; 1620/22-\$15,000;  
6400-\$14,000  
1401/1402-\$24,000

AALL DATA CO.  
105 Hinricher  
Willow Springs, Ill.  
312-839-5164

### I.B.M.

#### SALE OR LEASE

024-029-056-059-026  
031-077-080-403-552  
557-602A

#### BUY

All I.B.M. Equipment  
Field Engineering  
Service Available  
DP SERVICE INC

5505 N. Menard  
Chicago, Illinois 60630  
312/774-2556

### IBM 360 EQUIPMENT AVAILABLE FOR LEASE

Model 40/ 128K  
1410 Compat  
2 Selector  
Dec. Arith.

Model 30's/ 32K-64K

Model 20's/ C2-D2

IBM TAPE DRIVES 2401

Model 2, Model 3, Model 6

IBM TAPE & DISC CONTROLS  
Models 2403, 2803, 2841

IBM DISC DRIVES  
Model 2311

IBM COMMUNICATION  
CONTROL UNITS  
Model 2701 & 2702  
PRINCIPALS ONLY

### PLEASE CALL COLLECT:

JOHN PUTTRE  
(914) 428-5000

### FOR SALE

1741-1 UARCO

Burster with belt feed sequence stacker. 4 years old. Has been under continuous service agreement.

Write:

North Central Data Cooperative  
P.O. Box 728  
Mandan, North Dakota 58554  
Or call: Mr. Charles Weekly  
Productions Manager  
701-663-6511

### WANTED

A/R System

for IBM 360/30 2311's  
for 2 tape drives  
1100 card printer

CW Box 3197  
60 Austin Street  
Newton, Mass. 02160

### COMPUTER ACQUISITIONS CO.

#### WANTS

■ COMPUTERS, ALL  
MAKES  
■ UNIT RECORD  
EQUIPMENT

(404) 458-4425 • BOX 29185  
ATLANTA, GA. 30329

### KEY PUNCH RENTALS

029 KEY PUNCHES \$110/mo.  
059 VERIFIERS \$115/mo.

Immediate Delivery  
Call any of these TBI offices:  
Boston: 617-329-3280  
Chicago: 312-641-1970  
Dallas: 214-742-1171  
L.A.: 213-937-1760  
Philadelphia: 215-561-3255  
Wash., D.C.: 703-525-5940  
Baltimore: 301-837-5559  
N.Y.: 212-867-5661

TIME BROKERS, INC.

### PROFESSIONALS in purchase, placement and lease of computer hardware

Business Computers, Inc. is an organization of EDP professionals. If you're planning to buy, lease or sell computer hardware, BCI has some good news for you. Find out by contacting us. Write or call today.



Business Computers Inc.  
10844 Shady Trail  
Dallas, Texas 75220  
Ph. 214/358-0235

### SELLING YOUR COMPUTER?

Tell us first, we have waiting lists of customers. Free appraisal.

ABLE COMPUTER  
CORP.  
625 Bard Ave.  
Staten Island, N.Y. 10310  
212-273-3721

### BUY SELL LEASE

1401 C3-4K immediate delivery on IBM maintenance. Also 552, 519, 402, 082, 056, 026, 024. Wanted Honeywell 120-16K Systems.

(617) 757-1640

ARVCO COMPUTER CORP.  
118 Richards Avenue  
Paxton, Massachusetts 01612

### Honeywell 120 For Sale

\$125,000 24K, 4 Tapes  
Printer Reader/Punch  
Carlin-Black-Systems  
Corporation  
3376 Peachtree Road  
Atlanta, Georgia 30326  
404-261-2036

### BUY-SELL-LEASE

ALL TYPES  
DATA  
PROCESSING  
EQUIPMENT

COMPUTER DISCOUNT CORP

2400 E. Devon Ave.  
Des Plaines, Ill. 60018  
(312) 297-3640

### WANTED IMMEDIATELY To BUY or LEASE

IBM/ 360/65  
360-67

Principles:  
MARKETIME  
CORPORATION  
2 PENN PLAZA NYC 10001  
(212) 736-2430

### WANTED

IBM 360/65 I or J

For Purchase Used  
1970 Delivery  
Principals Only

CW Box 3202  
60 Austin Street  
Newton, Mass. 02160

### 360/30

available for 2 year lease

AT 70%

of IBM rental.

Principals preferred.  
Please call immediately.

Computer Finding Corp.  
150 E. 18th St., N.Y.C. 10003  
(212) 777-1315

### FOR SALE OR RENTAL ON IBM M/A

IBM 024, 026, 029,  
056, 059, 077, 085,  
519, 548, 082, 403, 407  
(212) 673-9300 x48

I.O.A. DATA CORPORATION  
383 Lafayette Street  
NYC 10003

### WANT TO BUY

360-20 Disc and Tape, 16K  
to 24K Prefer 2311 Disc  
Mod. 11, 2415 Tape 1402  
Printer, 2560 MFCM

Write or call N. Evenson  
Box 1632  
Pocatello, Idaho 83201  
208-232-7914



## Buy Sell Swap

### BUY SELL LEASE TRADE

IBM 1401's, 360's  
And Unit Record  
Equipment Under  
Maintenance Agreement  
Substantial Savings

**DESI**

Data Equipment And  
Supplies Inc.  
5738 N. Central Ex.  
Suite 101  
Dallas, Texas 75206  
214-827-4591

### FOR SALE

(Available Immediately)

16K with Graphics  
Display, A/D, D/A,  
Mag. Tape, Drum,  
Etc. Now Opera-  
tional.  
PDP-1  
Original Acquisition  
Price Nearly \$300,000

Selling Price  
\$30,000

Telephone: (617) 426-4200  
CW Box 3183  
60 Austin Street  
Newton, Mass. 02160

### Time for Sale

ILLINOIS

360-30 65K

ALL SHIFTS

CHICAGO AREA

Ken Stapley

312/654-4262

### NEW YORK



TIME IMMEDIATELY  
AVAILABLE

ALL  
SHIFTS

ALL COMPUTER  
SYSTEMS at

REASONABLE RATES

Call: Sy Wexler  
DATA SCIENCES CORP.  
150 West 52nd Street  
New York, N.Y. 10019  
(212) 586-7990

### COMPUTER TIME AVAILABLE

New Jersey, New York

360-30, 40, 50, 65,  
And 75 Time

ATTRACTIVE RATES  
CALL E.L.I. COMPUTER

N.J. 201-791-4000  
N.Y. 212-594-1010

### NEED TIME?

ANY SHIFT

ANY SYSTEM

Even the ones that  
are hard to find!

DATA ACCESS, INC.

212-675-5333

subsidiary of DATACHRON CORP.

### NEW JERSEY

## Rent our brain child

360-MOD-50  
\$100 per hour

### OS/MFTII-DOS

Telecommunications facilities.

Private ready rooms.

Relaxing atmosphere only  
50 minutes from New York  
or Philadelphia.

Call 609-8550, ask for  
Bob Perlman

Applied Data Research, Inc.  
Princeton, New Jersey

## Software for Sale

### 360 TELEPROCESSING/ CONTROL PROGRAM DOS - OS

An On-Line Control Program which  
provides you with:

- Terminal and Line Control Support
- Multi-Tasks Application
- Interfaces with ALC & COBOL  
Application Programs
- Audit File
- System Recovery

This system is currently in use and  
has proven to be highly successful.

### Automated Financial Systems Incorporated

One Decker Square  
Bala Cynwyd, Pa. 19004

### REPORT GENERATOR SOFTWARE PACKAGE

Print special reports from your tape  
or disk files in minutes using the load  
and go report generator program de-  
veloped by the Computer Depart-  
ment of a large NYSE Corporation.  
Program provides record selection,  
multiply-divide, report headings,  
multiple line print and 5 levels of  
program totals based on easy to code  
parameter cards. Written in 360  
Cobol for 32K Mod 30 D.O.S. Input  
Fields may be packed or unpacked.

We offer the Program at a very  
attractive mail order price of \$2,500.  
For more information, please write  
Box 3201 Computerworld  
60 Austin St.  
Newton, Mass. 02160

### PAC

PROJECT ANALYSIS & CONTROL  
is a comprehensive software package  
designed to control all data process-  
ing activities. This package enables  
management to analyze any size de-  
sign & programming project, and to  
take corrective measures immediately.  
PAC also measures individual per-  
formances, generates project cost  
analysis, program evaluation and his-  
tory, plus other valuable information.  
Most importantly PAC is simple to  
install, to use, and is very reasonably  
priced.

Don't you owe it to your company  
to investigate PAC? Join the fast  
growing number of satisfied users.

### FREE SEMINARS:

Pittsburg, Pa.	June 3
Cleveland, Ohio	June 4
Detroit, Mich.	June 5
New York, N.Y.	June 10
Washington, D.C.	June 16
Atlanta, Ga.	June 16
Miami, Fla.	June 18

For Information Call Or Write:

INTERNATIONAL  
SYSTEMS, INC.  
CONTINENTAL ARMS  
KING OF PRUSSIA, PA. 19406  
(215) 265-1550

### GENERAL LEDGER SYSTEM PROVIDES

Management Responsibility Reporting  
Multiple Company Capability  
Chart of Account Independence  
Automated Consolidations  
Comparative Analysis  
Current Outlook Projections  
Monthly Budget Calculation  
Special Account Analysis  
Flexible Report Content  
Automatic Error Suspense

Written in Cobol, 32K,  
\$10,000

### ancom systems

9841 Airport Blvd.  
Los Angeles, California 90045  
(213) 776-6810

### COMPUTERWORLD

carries more  
SOFTWARE  
advertising  
than any other  
data processing  
industry  
publication  
ARE WE  
CARRYING  
YOURS?



### infomacs

The incredible new  
report generator and  
file creator that  
revolutionizes report  
writing and live test  
file generation.

### Load and Go Environment

#### DISK-TAPE

Sequential/Isam  
Variable/Fixed

- Control card language
- Learned in minutes
- 70% fewer cards than RPG
- Output—Edited Report  
—File
- Process—Entire file  
—Selective records

#### Create selective test file from live data file

- Maximizes testing environment
- Reduces test time

#### One-Time Reporting

- Produce report instantly
- No more special programming  
projects

Write for new 1970 technical  
data and operating instructions,  
free demonstration and  
pricing information.

### MACS

104 Park Towne Place East  
Philadelphia, Pa. 19130  
215/LO 8-6860

### TELEPROCESSING SYSTEMS

DESIGNED FOR THE USER!

- SIMPLE
- APPLICATION - INDEPENDENT
- 2nd GENERATION COMPATIBLE  
FEATURING INQUIRY, DATA  
COLLECTION, MESSAGE SWITCHING

THE ULTRA SIMPLE INFORMATION SYSTEM  
UTILIZES EXISTING FILES AND PROCESS-  
ING SYSTEMS. IT CAN BE IMPLEMENTED  
WITHOUT EXPENSIVE PROGRAMMING AND  
SYSTEMS DESIGN. FOR MORE INFOR-  
MATION, CONTACT



411 Victory, Little Rock, Ark. 72201  
(501) 372-7158

### Don't Install 2260's

(or any other  
key-driven terminal)

without  
**GRAPHICS**  
a complete software package

### turnkey systems inc.

one eleven east avenue  
Norwalk, Connecticut 06851  
(203) 838-4581

### datamacs

The incredible new  
test data generator  
that completely  
revolutionizes the  
normal procedure of  
creating test data.

### Load and Go Environment

Creates all types of files

DISK

- Sequential
- Index Sequential

TAPE

- Variable
- Fixed

Data generated for  
each field

- Constant-specific values
- Sequential values
- Random numbers
- Clusters
- Computational
- Mix—All of the above

Write for new 1970 technical  
data and operating instructions,  
free demonstration and  
pricing information.

### MACS

104 Park Towne Place East  
Philadelphia, Pa. 19130  
215 LO 8-6860

### ACCOUNTS PAYABLE COBOL (Disc/Tape)

- Excellent cash  
management capability
- Handles multi-division  
companies with only two  
easy-to-use input forms
- \$6,000 or \$200/month

### URS

URS DATA SCIENCES CO.  
1700 South El Camino Real  
San Mateo, Ca 94402  
(415) 349-5111

## SALESMAN WANTED TOTALTRAN

... the most success-  
ful Disassembler and  
Translation package  
in the country is look-  
ing for salesmen to  
follow up hundreds of  
leads throughout the  
50 states. Our sales-  
force cannot handle it  
all.

- \*LARGE DOLLAR  
CONTRACTS
- \*LEADS SUPPLIED
- \*LIBERAL COMMISSIONS

Call or write:

PETER D. COLGAN, V.P.  
CPU MANAGEMENT  
ADVISORY CORP.  
853 Broadway, N.Y. 10003  
Phone (212) 777-7722

IBM 360-40  
1401/1410 Compatibility  
OS DOS  
Key Punching - Programming  
COMPUTIME OF CHICAGO  
209 WEST JACKSON BLVD  
CHICAGO ILL. 312 922 6624



Open 24 hrs a day  
7 days a week  
CHICAGO LOOP

Guaranteed Prime Time

### FOUR SYSTEMS

360/30 65K

6 Tapes 4-2311's

360/40 131K

6 Tapes 5-2311

360/40 131K

6 Tapes

2314 A01

Standard IC-6000 with

micro programming

1401/1410/7010:

7044/7094 DOS -

OS-CS/30 CS/40

DATANAMICS

624 S. Michigan

Chicago, Ill. 60605

(312)939-1323

VOLUME DISCOUNTS

### MASSACHUSETTS

HONEYWELL

COMPUTER TIME AVAILABLE

H-120 12K-450 LPM Printer

4-13 KC Drives

Card Reader/Punch.

WILBAR'S, INC.

59 Mason Street, Boston, Mass.  
Call Mr. Fitzgerald (617) 482-4970



## COMPUTER SOFTWARE TRAINING

### DOCUMENTATION TECHNOLOGY

#### ARE OUR SPECIALITIES

in-house presentation  
available on:

1. MINICOMPUTERS  
& APPLICATIONS
2. TELECOMMUNICATIONS  
& MESSAGE SWITCHING

for information write or call:

**DATA INSTITUTE, INC.**  
200 Park Avenue, Suite 303E  
New York, New York 10017

(212) 687-2066

## HONEYWELL USERS

Our variable and data  
name cross reference  
indexing programs for  
**FORTRAN & COBOL**  
will work great on  
Honeywell systems.

Write Us. Or Phone:  
312-748 2900

### DMD

data for management decisions, inc.

22335 Governors Hwy.  
RICHTON PARK, ILL. 60971

## Information Retrieval and File Maintenance

### On-line, high-speed.

**On-Line Retrievals:** Use *and, or, not*,  
etc. to compose requests. Answers  
provided instantly.

**On-Line File Maintenance:** Change  
existing records, add new records,  
directly from on-line terminal.

**Variable-Length Records:** All  
records consist of a variable number  
of variable-length fields.

**Display Terminal:** Use IBM 2260  
display terminals. Other terminals  
also supported.

**Easy to Learn:** Non-programmers  
can learn to use the system in a few  
minutes.

**On-Line Format Specification:**  
Display only the information you  
really want to see.

**Cross Reference:** Several files may  
be stored and cross referenced  
directly from terminal.

**Cross Tabs:** Cross tabs and other  
reports may be requested from  
terminal.

All of this is available from Computer  
Corporation of America in 2 models:  
Model 103 for IBM 360/DOS and  
Model 104 for IBM 360/OS.

Write us for information. And specify  
which model you're interested in.

And if you're interested in the batch-  
processing mode of operation,  
specify that, too.

Our address is Technology Square,  
Cambridge, Massachusetts 02139.

**Computer Corporation  
of America**

# Software for Sale

## PRO/TEST

A PROFITABLE approach  
to TESTING

- GENERATES ANY FILE  
IN MINUTES FOR:
  - Program Test
  - System Test
  - Bench Marks
- REPORTS PERMIT TEST  
DATA MANAGEMENT
- NO PROGRAMMING  
EXPERIENCE REQUIRED
- LANGUAGE AND  
PROGRAM INDEPENDENT
- IBM S/360 - OS - DOS/  
HONEYWELL
- SATISFIED USERS  
NATIONWIDE INCLUDE:
  - Major computer  
manufacturers
  - Leading shipbuilder
  - America's largest  
group medical plan
  - Firms in banking,  
insurance and  
manufacturing

For Information:

**SEARCH, INC.**

357 E. Center St.  
Manchester, Conn.  
203-643-1179

**SYNERGETICS CORP.**

Second Avenue  
Northwest Industrial Park  
Burlington, Mass.  
617-272-3450

## QUICKDRAW FLOWCHART SERVICES

Over 1200 installations now  
rely on automated documenta-  
tion. Now, get your program-  
ming investment protected the  
modern way.

Get complete cross-references,  
logic diagnostics and detail  
flowcharts from your source  
programs.

Most languages. Inexpensive.

## SDC

SOFTWARE DOCUMENTATION CORP.  
3550 W. PETERSON / CHICAGO 60645  
312/478-8404  
27 W. 69TH ST. / NEW YORK N.Y. 10023  
212/973-4530

## PAYROLL/PERSONNEL ACCOUNTS PAYABLE DOCUMENTATION SYSTEM TEXT EDITOR SYSTEM

Modular/Well-written  
Standard 360 COBOL  
Easily Maintained  
Customized  
DOS/OS

## PACKAGE SYSTEMS

References  
90-Day Guarantee  
Implemented/ Tested  
Modification Services  
Complete Documentation

For details contact:  
**COMM-SCI SYSTEMS CORP.**  
785 Market Street  
San Francisco, Calif. 94103  
(415) 392-5379

## CDC TO IBM FORTRAN AUTOMATIC CONVERSION

Translates CDC programs into a  
standard Fortran for 360, IBSYS  
etc at a cost of only 10 cents/  
card.

### SOFTWARE STANDARDS

4401 Keswick Road  
Baltimore, Md. 21210  
301-235-2250

## MARGEN™

RCC's Management Report GENerator.  
Selects, integrates, coordinates data  
from your existing files into simple,  
easy-to-read reports in hours, not  
days!

## MARGEN

Satisfies the need for one-time or  
non-repetitive reports. Shows dra-  
matic time savings on cross-tabulated  
reports!

## MARGEN

For use on IBM and RCA systems.  
Does not require the creation of in-  
termediate files—any standard file  
which can be read sequentially can  
be used with MARGEN!

## MARGEN

Easy to use. Even non-OP people can  
use it. Just lay out the report, punch  
your program directly from the re-  
port form, load and go!

## MARGEN

If you're evaluating software pro-  
grams, write for literature. If your  
need is immediate, get your decision-  
makers together and phone right now  
for an on-site demo. MARGEN will  
prove itself.

## RCC

## RANDOLPH COMPUTER CORPORATION

1425 East McMillan St.,  
Cincinnati, O. 45206  
(513) 961-5400  
Offices in principal cities

UNIVAC 1108 BDP Breakthrough!  
File Management System for Tape  
File Creation, Updating and Reporting  
Designed & Implemented by COBOL  
Experts:

**SEIDEL COMPUTER ASSOCIATES**  
8949 Reseda Blvd. Suite 107  
Northridge, Calif. 91324  
(213) 349-1345

## \* ACCOUNTS PAYABLE

## \* GENERAL LEDGER

## \* ACCOUNTS RECEIVABLE

## \* JOB COST



MANUFACTURING MANAGEMENT SCIENCES, INC.

- S/360 - 25 AND UP
- ALL INSTALLED
- WE IMPLEMENT AND MAINTAIN
- WE GUARANTEE

**MANUFACTURING MANAGEMENT  
SCIENCES, INC.**  
279 CAMBRIDGE ST.  
BURLINGTON, MASS.  
617-272-2970

## PROPRIETARY SOFTWARE PACKAGE

### — OUTRIGHT SALE —

- Completely Documented
- Users Guides
- Sales & Promotional  
Literature
- Demonstration Kit
- Sales Leads
- Customer References

REPLY: Box 330  
Garrett Park  
Maryland 20766

## 6K COBOL CROSS-REFERENCE

Now available to 360 DOS users: a  
6K COBOL CROSS-REFERENCE  
that provides a sequential listing of  
all data-name and literal usage. This  
program uses a maximum of 25  
cylinders of a 2311 or 2314 to  
handle up to 9,375 entries, approxi-  
mately 7,500 to 10,000 source cards.  
Execution time is extremely fast. 6K  
storage requirement includes fore-  
ground save area. Nothing like it.

Price: \$200.00

Call or write:

**AMERICAN COMPUTER LEASING**  
ONE EAST FOURTH STREET  
CINCINNATI, OHIO 45202  
(513) 579-2211

## BOND ACCOUNTING & BOND PRICING

- Prepares Securities Subsidiary Ledger
- Prices individual issues
- Produces comprehensive management  
information
- \$10,000.00 for total package  
can be priced separately



**URS DATA SCIENCES CO.**  
1700 So. El Camino Real  
San Mateo, Calif. 94402  
(415) 349-5111

## GMS SYSTEMS, Inc.

Accounts Payable	4,000
General Ledger	3,000
Job Costing and Budget Control	10,000
Equipment Depreciation and Maintenance	4,000
General Purpose Payroll	4,000
Inventory Management System	15,000

## APPLICATION PACKAGES

All Programs in COBOL  
Disk or Tape 16K Memory Required  
Write or Call

## GMS SYSTEMS, INC.

3505 Brainerd Road  
Chattanooga, Tennessee 37411  
615/629-6072

## FIGHT INFLATION

Economists tell us inflation is perpetuated by un-  
necessary expenditures. Writing COBOL without  
SPEEDBOL is inflationary. SPEEDBOL, our proprietary  
short-hand system for COBOL, is keeping down the  
cost of programming and keypunching at installations  
throughout the country. SPEEDBOL abbreviates the  
most common COBOL reserved words and lets you  
abbreviate your own commonly used Data and Pro-  
cedure Names. Versions now available for IBM  
System 360 and Honeywell Series 200.

For details write, specifying con-  
figuration, to:

**PIONEER DATA SCIENCES**  
P. O. Box 236/Wilbraham, Mass. 01095

## 360 Payroll System — 100% COBOL —

Series of 23 programs which process  
hourly and salaried payrolls in a  
multi-company environment. Liberal  
deduction capabilities. Full labor  
distribution reporting. Complete file  
maintenance facilities. Excellent  
documentation. Runs on IBM 360  
with 32K and two 2311 Disk Drives.  
This system is now being used and has  
proven highly successful.

PRICE: \$ 5,000.

**Automated Financial Systems  
Incorporated**  
One Decker Square  
Bala Cynwyd, Pa. 19004

## Eliminate cryptic cobol with — **ANCOM's** Cobol Documentation System

Converts data element mne-  
monics to descriptive names

Replaces existing paragraph  
names with computer gener-  
ated names that are sequen-  
tially related

Presents all programs in a  
standard format

Produces alphabetical Data  
Name and Paragraph Name  
Cross References

Requires 32K, 3 storage de-  
vices, \$1,500 or lease

**ancom  
systems**

9841 Airport Blvd.  
Los Angeles, Calif. 90045



May 27, 1970

Page 35



For the last time, Specialist William J. Graham manually records the last sale of a security on the American Stock Exchange trading floor.

## Amex Updates Quotations With Electronic Display

NEW YORK — The American Stock Exchange has inaugurated automated data displays on the floor of the exchange. Triggered by electronic keyboard input, the displays provide continuously updated stock quotations.

The six-sided, computer-driven displays, mounted over each of the Amex's 12 trading posts, report bid, asked, and last sales prices, and indicate whether the latest transaction was up or down from the previous sale for each of the about 100 securities traded at each post.

The automated system frees specialists from the manual posting chore and permits greater concentration on the vital market-making function.

Glancing at the new quotation display, a broker with an order to sell short would know immediately whether the issue was trading on a uptick, permitting execution of the trade, or on a downtick, where he would be prohibited by exchange rules from executing the short sale.

"This is more professional,"

said one Amex specialist, terming his panel "my most important facility."

"This speeds up my job. Under the old system, when we had to keep up this information by hand, I had to do it myself or take the time to make sure my clerks did it," the specialist added. "And brokers, thinking that the boards might not be up to date under the old system, would invariably ask me what the market was in a stock. Now they can just look."

The computerized quotation displays are updated by exchange clerks feeding information by electronic keyboards into the system. Market transaction reports are initiated by reporters. Bid and asked data is supplied by stock specialists.

Input to displays is instantaneous. The data is transmitted to computers, which feed updated figures to a signal controller and then to the electronic quote boards.

The panels were designed and manufactured by Ferranti-Packard Electric, Ltd., Toronto.

## Hudson Leasing Earnings, Revenues Show Increase

GREAT NECK, N.Y. — Hudson Leasing Corp. recorded increased earnings for the first three quarters of fiscal 1970, compared with the same period last year.

For the nine-month period ended March 31, Hudson Leasing had net income of \$1,606,296, compared with \$966,992 for the similar period last year. Revenues for the nine months were \$16,962,342, which compared with \$11,535,640 for the similar period a year earlier, according to Jay B. Langner, president.

Primary earnings per share increased to \$1.04 compared with 79 cents for the first nine

months of fiscal 1969. The 1969 earnings do not include a 9 cent per share non-recurring gain earned in that year.

Langner noted that earnings per share for the three-month period ended March 31 were lower, although both revenues and earnings were higher than the comparable period in 1969.

Revenues for the quarter were \$5,822,360 compared with \$4,300,952; net income was \$390,763 compared with \$366,515; primary earnings per share were 25 cents compared with 30 cents, based on a larger number of shares outstanding in 1970 over 1969.

## IBM Hit With Damage Suit by L-T In Response to Repossession Bid

NEW YORK — Responding to IBM's attempt to repossess computers on which Levin-Townsend Computer Corp. (L-T) has accumulated \$14 million in overdue payments, L-T has filed a \$55 million damage suit against IBM and obtained a temporary restraining order to prevent IBM from taking back the machines.

IBM has charged that L-T has not been meeting payments fully since last July.

L-T is also seeking a preliminary injunction that would stop the IBM repossession until the suit is decided.

### Illegal Tie-In

The suit contends that IBM required L-T to make unwarranted and illegal payments of \$55 million for services and special features to get IBM equipment. These figures break down to \$38 million in service charges incurred after IBM's unbundling, and \$17 million for special features and model changes necessary to get IBM equipment. Levin-Townsend termed the latter an illegal "tie-in" arrangement.

The leasing company said IBM had rebuffed two proposals to discharge the debt and had threatened to exercise a right to

demand payment of all of L-T's outstanding debt not yet due. L-T also said that it has made a new overture to IBM, offering to release IBM equipment equal in value to the total outstanding debt. IBM has not yet replied to this offer.

### IBM Rejection

In the suit, L-T President James E. Townsend affirmed that IBM had rejected a settlement involving Randolph Computer Corp., another leasing company. That arrangement involved Randolph buying computers valued at \$50 million from L-T. In return, Randolph would immediately pay \$31 million of L-T's debt to IBM, among other things.

Townsend said in an interview that IBM rejected this offer because of a provision that would have protected Randolph from any financial loss if the contracts were broken. Apparently this would have moved financial liability and legal costs to IBM, which was not a party to the negotiations between L-T and Randolph.

### Must Lead to Bankruptcy

The suit also asserts that IBM

rejected an offer to transfer to IBM "a sufficient number of computers to discharge completely all Levin-Townsend's present and future obligations to IBM. . . ."

An L-T attorney said IBM turned down this offer because it would "somehow 'defraud' Levin-Townsend's long-term creditors of a right to declare their indebtedness immediately due."

The attorney went on to call the reason "nonsense" and to say, "What does appear . . . is that IBM isn't primarily interested in collecting the money which it claims to be due, but, on the contrary, is primarily interested in doing so in a way which . . . must lead to [Levin-Townsend's] bankruptcy and its elimination as a competitor of IBM. . . ."

Levin-Townsend's complaints about unbundling are the same as the grounds for a \$750 million suit filed against IBM by Howard Levin on behalf of the leasing company.

Levin was fired as chief of the leasing company in January when L-T's cash flow problems became public.

IBM termed the suit "wholly without merit."

## LTV Board Change Signals 'Restructuring'

DALLAS — A surprise meeting of the board of troubled Ling-Temco-Vought, Inc. (LTV) has resulted in a "major restructuring" of the company.

James J. Ling, guiding spirit of the conglomerate, has moved down from chairman to president, and Robert H. Stewart III, chairman of the First National Bank in Dallas, has taken over the chairmanship. In addition, the size of the board was reduced from 20 to 14, and Sam Wyly, chairman of University Computing Co., was elected a director.

Clyde Skeen, former LTV president, resigned.

Last year LTV lost \$38 million, the largest loss of any of the top 500 industrial companies in the U.S. The corporation's first quarter operating loss was \$6.5 million.

University Computing recently purchased part of Computer Technology, Inc. from LTV Aerospace Corp., an LTV subsidiary. Wyly's election to the LTV board was interpreted by industry sources as a result of this sale.

The conglomerate is burdened with a total long-term debt of \$864.2 million, and debentures at rates from 5% to 6-3/4% account for over half of this amount.

Besides debt service, the company has been plagued with an antitrust action by the Justice Department and operating problems in its subsidiaries.

Ling's move may enable him to devote more time to line management. The board's announce-

ment was vague, however, saying only that Ling and Stewart will "share policy-making responsibilities" and that the "restructuring" was designed "to streamline the company's operations."

Ling said that with the exception of Jones & Laughlin Steel Co., all of the LTV subsidiaries are operating profitably. He said that Jones & Laughlin had been hurt by the truck strike.

Ling asserted that his company will continue to meet all of its interest payments "promptly and on time." The size of LTV's debt and the operating losses of the corporation's divisions have raised doubts that LTV would be able to meet the payments.

Stewart noted: "My responsibility to First National Bank in Dallas will continue to be foremost in my mind. . . ."

## 1st Quarter Revenues, Earnings A Record for Programming Methods

NEW YORK — Programming Methods, Inc., computer systems and proprietary software firm, has reported record revenues and earnings for the three months ended March 31, 1970.

According to George Langnas, president, revenues for the first quarter reached \$1,281,538, a rise of 24.4% over the \$1,029,768 recorded for the same period in 1969. Net earnings climbed 29.7% to \$122,121, equal to 14 cents per share, from

\$94,136, or 11 cents per share, last year.

Langnas said the sharp rise in net earnings was due in part to increased sales of proprietary software packages which have high profit margins.

Sylvania Electric Products, Inc., a subsidiary of General Telephone & Electronics Corp., owns approximately 72% of the outstanding shares of Programming Methods, Inc.

## Calcomp Reports Net Earnings Drop

ANAHEIM, Calif. — California Computer Products, Inc. has reported net earnings of \$459,947 on revenues of \$16,475,496 for the nine months ended March 29, 1970, compared with earnings of \$668,914 on revenues of \$14,010,930 for the same period last year.

Earnings amounted to 20 cents per share on 2,278,573 average

shares outstanding, compared with 31 cents per share on 2,251,346 average shares outstanding a year ago.

Lester L. Kilpatrick, Calcomp president, said third quarter earnings of 10 cents per share exceeded third quarter earnings last year and equaled earnings reported for the first six months of the current year.

# At Hetra, we think harder than the Original Thinkers.



It really works.

In one corporation we know of, THINK signs hang in every room in every office.

Out of this thinking came the whole computer industry.

So we thought we'd try our hand at the game. We developed a THINK sign all of our own.

Only it says THINK HARDER. And it worked.

Out of harder thinking came a whole family of communications computers. Front ends, multiplexers, control computers, programmable remote terminals.

And a line of free-standing computers. All designed for character and character string handling and manipulation. Strong performers in business and communications applications.

They're all built from our basic Hetra processor. By using firmware macro-programming so advanced that the Original Thinkers didn't even think of it.

Maybe you'd like to join the THINK HARDER crusade. Our salesman will bring you a sign for your desk. Just like the Original Thinkers have on theirs. Only more thought provoking.



The thought-provoking Hetra processor

**We think harder.**

About delivery and how we'd like to earn your money sooner. So we're offering delivery in 90 to 120 days.

**We think harder.**

Hard enough to work from one processor design and a few highly sophisticated firmware packages. It adds up to much lower costs. And prices that are 30% to 50% below leading competitors for similar applications.

**We think harder.**

Hard enough to turn the Hetra processor into the Hetra S Series data processing systems. Faster and more powerful than the small system the Original Thinkers thought of. With a greater range of peripherals.

**We think harder.**

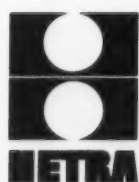
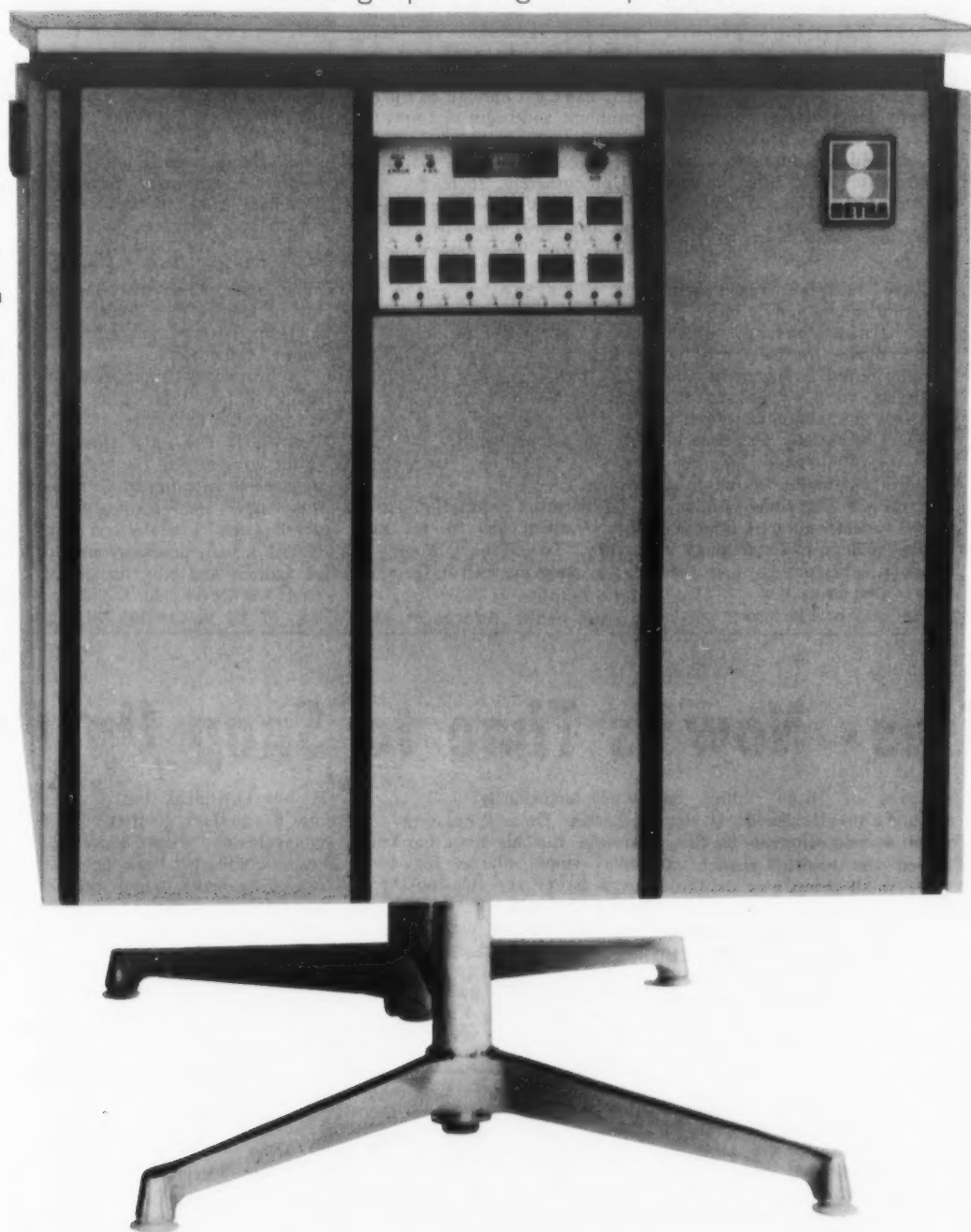
So we changed the firmware and the versatile Hetra processor became the Hetra C Series communications computer. It handles any kind of terminal. Any central processor. With code conversion, translation routines, line handling, logging, message switching and network analysis.

**We think harder.**

And we turned the Hetra processor into the Hetra T Series remote terminals. Terminals with core memory that's fully programmable. That handle disk packs, tapes and CRT's. All features that the Original Thinkers never thought to add.

**We think harder.**

About your problems. Right from your first call to our open line. Dial (305) 723-7731.



**We think harder.**

HETRA P.O. Box 970, Melbourne, Florida 32901 (305) 723-7731

# Viatron Dealers to Play Important Role in the 'Dream'

By Michael Merritt  
CW Staff Writer

*We haven't been putting out a 100% effort selling Viatron. — A western Viatron dealer.*

Viatron's original plans called for shipping about 75,000 System 21 terminals a year. Now it may be easy to sell 75,000 donuts just by opening up a couple of shops, but when it comes to a \$5,000 piece of EDP equipment, it's a different story.

*There's not enough money incentive. — A midwestern Viatron dealer.*

A car dealer has a buying public that knows it needs cars, at least. Viatron dealers are going to have to sell to people who have never even heard of distributed data entry.

*Why should we promote when we can't get delivery? — An eastern Viatron dealer.*

As a matter of fact, Viatron's dealers have a very important role in accomplishing the dream. Volume manufacture is pretty silly without volume sales, and in order to achieve volume sales a few years from now, Viatron dealers are going to need the selling ability of insurance agents, the skills of a systems

analyst, and, now, the financial resources of a large car dealer.

Dealer networks don't spring up overnight; American Motors has been trying to nurture one for years with only mediocre success. Among the other miracles it is trying to perform, Viatron is attempting to establish a strong dealer network in two years.

There are problems, however. A recent Viatron dealers' meeting showed considerable disenchantment. First, the dealers were mad that Viatron couldn't ship anywhere near as many terminals as the dealers could sell.

There is also resentment toward the company's move to discontinue leasing, which simply moves the burden of financing rental arrangements on to the dealers. They feel that the company should be handling this problem, especially in a time of tight money. (Auto manufacturers, incidentally, found long ago that the only successful way to run a dealer network is to sell to the dealers, albeit through a financial subsidiary, just as Viatron is now doing.)

What may be a necessary move,

though is still disturbing to the dealers.

These two complaints, which both translate into "We're not making enough money," lead to a host of minor grumbles. The dealers feel alienated from the company, complain of being talked down to, rankle at new product announcements when they can't get enough of the old products, and begin to doubt the ability and credibility of the parent company.

Unfortunately, there are valid reasons for Viatron's lagging production and sale-only policy. Right now the company has no line of credit with any bank. It has about \$10 million in the bank, and purchase commitments that must be over \$75 million for the next year and a half. If the company can show a strong trend toward profitability, a line of credit will materialize, in all probability. If they can't turn the company around . . .

To increase production facilities, Viatron has to get new money. To get new money, it has to make do with the production facilities it now has. So Viatron dealers have to be satis-

fied with their share of the 600-900 units per month current production.

Any new financing Viatron gets will have to be devoted to increasing the capacity of the company; there won't be any left over to play finance company with. So the dealers have to scratch for themselves to find financing or a third party lessor.

Which doesn't make the dealers happy. So it goes.

But the actions that are immediately necessary have unfortunate consequences in the future. In a few years Viatron is going to have competition — foreign or domestic — at its own price levels. Then the company will be hurting if it doesn't have a strong network of aggressive, happy, rich dealers.

The secondary grumbles, meanwhile will have their effect. With the possible exception of IBM, Viatron is the most rumored-about company in the industry. Because it is trying to do something new and seemingly impossible, and because it is doing it with a truly necessary amount of fanfare and advertising, Viatron has developed a visibility out of all proportion with its

size.

And because production problems and the credit squeeze have stopped the company from meeting all its goals, the rumor mongers have had a ball predicting that the company is going under any second.

And what's worse, a real though unwarranted lack of trust in the company's statements has developed.

People think twice about buying an expensive piece of equipment from a company they've heard is going bankrupt. Even more so if they aren't really sure they believe the company's announcement that it isn't.

Viatron President Edward Bennett has said that he is trying to change his company's image into that of a "conservative, staid, old-line company overnight." He has to for his bankers.

But looking a few years into the future, he has to do it for sales as well. There has been almost unanimous praise for the Viatron equipment. Viatron now needs to inspire the same sort of faith in the company that is going to have to stand by the equipment.

## Dicomes on Stocks

# Phoenix Rises—Now Is Time to Snap Up Bargains

For weeks now, it seems, I have tried to convince my readers and myself that the market has deflated itself as much as it dares. Now, after last week's action, even the market itself seems to be saying this. But, whence come the forces that still drive it lower and lower?

A 15-1/2 point loss the week before last has been too consistent a pattern.

But then, the phoenix burns itself to death before it rises anew from its own ashes. This then, is the current picture: an uncertain market, hampered by inflation, national and international crises, tight money, high interest rates, a lack of confidence in its own future, and, finally, no foundation from which to build, has thrown all the above logs into the fire and now wearily looks for a way out of the ashes.

At least our thoughts are finally shared with others. After predicting an end to a bear market which has almost bankrupted our favorite computer stocks, we must look forward to the values that remain and decide which stocks we still feel worth buying.

The values we will decide upon will be predicated upon market acceptance and not necessarily basic values within the company under discussion. This seems a poor way to evaluate companies which can and will make money, but, still, we must remain slaves to a demanding public who wants profits now and not later with promises. So, with a purely mercenary point of view, measured in dollars and cents in a currently fluctuating market, here we go!

Control Data must be our first case in hand. Soaring from a value worth pennies when underwritten in 1957, CDC has risen to the heights and made mil-

lionaires of those willing to gamble a few thousands. Having grown around Minneapolis, CDC helped the healthy growth of many small companies that followed in its wake.

However, with stock options almost worthless and many investors disconsolate with present results, CDC remains an enigma to investors — either it is a good buy now or should be avoided for fear of more wild fluctuations.

(I think it is a Hobson's choice and can be bought as safely as any of the other good computer stocks which have been so depressed in this ravaged market.) The values, again, remain the same; all that is lacking now is the confidence of those who own stock in the company.

In short, if you own CDC shares at higher prices, don't hesitate to cost-average your shares at these current bargain day prices! Bargain day in this stock may not last too long!

This market has shown a shift from pessimism to fear. Although this may not last too long, we can safely buy any of the following issues at these prices and not regret it: Burroughs, Foxboro, Digital Equipment, Potter Instruments, Wang Labs, IBM, Xerox, IT&T, Telex, Ampex, American Research & Development, et al. As some of our stocks come into the news, we will comment on their desirability even at these prices.

And this must be the touchstone for selection. For, even though we are in what we may hope to be as depressed a market as we shall see for quite a while, there are some companies in our computer groups which should be avoided even at these deflated prices.

Let's avoid the following

stocks temporarily:

Leasco Data Processing — at around 12, this stock has fallen apart since volatile, high-leveraged issues are the most fearsome at this time and, apparently, investors are wary of companies that depend on the lease of data processing equipment and unrealized capital gains.

Data Processing Financial and General — at 9 a share, still no bargain! Uncertain proated

Robert DiComes comments on the stock market for CW from time to time. Educated at Harvard, DiComes is a retired broker who spends his time managing his stock and real estate portfolios, and a farm in New Hampshire.

charges, no positive outlook, and a seeming lack of confidence by management warrant the sale of this company's shares at even lower prices if necessary.

University Computing, again a fallen-apart at the seams situation with no immediate cheering prospects. Why stay with this when we can find more allure in other companies which we have already discussed?

Computer Sciences — at 11-1/2, no bargain. Recently reported earnings of 41 cents for year ended March 27, 1970, versus 53 cents per share in 1969 are not the only discouraging factors; although a leading company in the services end of the computer industry, the outlook is not bright because of a lack of funds and means to produce them for some of management's more grandiose expansion plans. Any of my favorites listed earlier in this column will offer a lot more in the immediate future than this company can.

And now we have taken our stand, let the market speak for us. The faint of heart will laugh

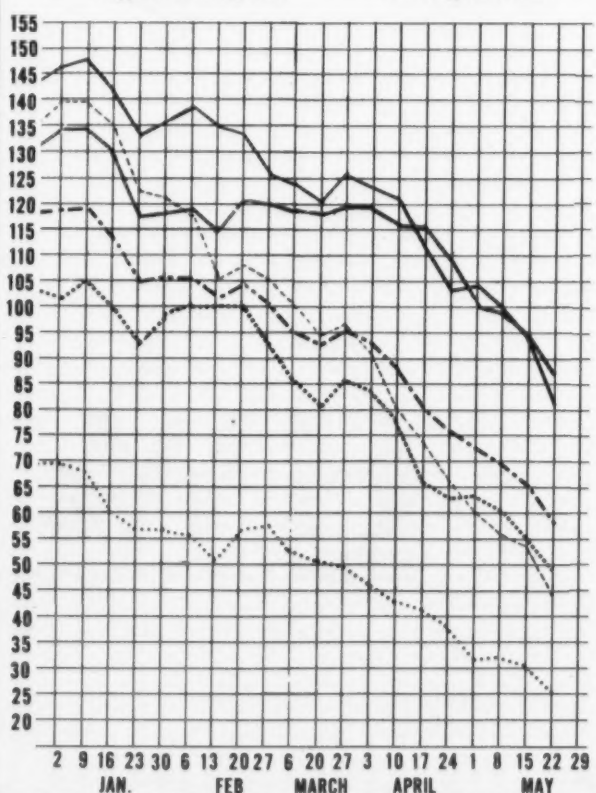
at our optimism, but we feel that if one buys the better quality, avoids the poorer issues, and keeps looking for basic values, he can easily make money even in this diffident market.

At present the model portfolio remains at about 75% value of our original investment, and has remained at this level for the

past month or so, even with the market plunging deeper. We may not have bought at the lowest point in a falling market, but we are certain that we have probably seen the lowest price for our selected list for quite a while. Yes, knowledgeable investors would be well advised to buy any or all of our portfolio stocks now.

## Computer Stocks Trading Index

— Computer Systems      - - - - Software & EDP Services  
- - - - Peripherals & Subsystems      - - - - Leasing Companies  
— Supplies & Accessories      - - - - CW Composite Index



BASE FOR EACH TRADING INDEX: 100 as of 3/1/68



# Computerworld Stock Trading Summary

NEW YORK AND AMERICAN STOCK EXCHANGE CLOSING PRICES, FRIDAY, MAY 22;  
OVER THE COUNTER AND NATIONAL STOCK EXCHANGE, THURSDAY, MAY 21

## SUPPLIES & ACCESSORIES

EXCH	1970 RANGE	CLOSING PRICE	WEEK NET CHANGE	WEEK PERCENT CHANGE
N	15-9	9 1/8	ADAMS-MILLIS CORP	-1 3/8 - 13.10
O	21-14	14	BALTIMORE BUS FORM	---
A	25-8	8 1/8	BARRY WRIGHT	-3/8 - 4.41
A	35-19	19 3/4	DATA DOCUMENTS	-2 1/2 - 11.24
N	19-12	12 1/2	ENNIS BUS. FORMS	-1/8 - 0.99
O	17-9	9	GRAPHIC CONTROLSCORP	-1 - 10.00
N	166-63	67 1/4	MEMOREX	-14 3/4 - 17.99
N	114-82	83 1/2	3M COMPANY	-6 1/2 - 7.22
O	38-30	30 1/4	MOORE BUS FORMS	-1 1/8 - 3.59
N	43-21	21 1/2	NASHUA CORP.	-3 1/2 - 14.00
O	48-30	32	REYNOLDS & REYNOLD	+1 + 3.23
O	30-22	22 1/2	STANDARD REGISTER	-1 1/2 - 6.25
N	39-25	25 5/8	UARCO	+1/8 + 0.49
A	30-8	8 7/8	WABASH MAGNETICS	-3 3/8 - 27.55
O	41-30	30 3/4	WALLACE BUS FORMS	-3/4 - 2.38

## COMPUTER SYSTEMS

EXCH	1970 RANGE	CLOSING PRICE	WEEK NET CHANGE	WEEK PERCENT CHANGE
N	172-102	103 1/2	BURROUGHS CORP	-18 3/4 - 15.34
N	37-15	16 7/8	COLLINS RADIO	-1/8 - 0.74
N	122-36	37 1/8	CONTROL DATA CORP	-4 3/4 - 11.34
A	124-59	61 5/8	DIGITAL EQUIPMENT	-12 5/8 - 17.00
N	11-4	4 7/8	ELECTRONIC ASSOC.	-3/4 - 13.33
A	14-4	5	ELECTRONIC ENGINEER	-1 - 16.67
N	39-25	25	FOXBORO	-2 3/8 - 8.58
O	42-13	13 3/4	GENERAL AUTOMATION	-2 1/4 - 14.06
N	77-62	63 3/4	GENERAL ELECTRIC	-2 7/8 - 4.32
N	45-27	27 5/8	HEWLETT-PACKARD CO	-5 1/2 - 16.60
N	152-82	86 7/8	HONEYWELL INC	-20 - 18.71
N	387-243	248	IBM	-22 3/4 - 8.40
N	86-50	52	NCR	-4 - 7.14
N	34-20	21	RCA	-1 1/4 - 5.62
N	33-18	18 1/2	RAYTHEON CO	-2 7/8 - 13.45
O	8-2	2 3/4	SCI. CONTROL CORP.	-1/2 - 15.38
N	40-24	25 3/4	SPERRY RAND	-3 1/4 - 11.21
A	49-17	17 3/4	SYSTEMS ENG. LABS	-2 1/4 - 11.25
N	29-14	14 7/8	VARIAN ASSOCIATES	-1 5/8 - 9.85
A	51-22	22 3/4	WANG LABS.	-4 1/4 - 15.74
N	115-74	75 3/4	XEROX CORP	-5 - 6.19

## LEASING COMPANIES

EXCH	1970 RANGE	CLOSING PRICE	WEEK NET CHANGE	WEEK PERCENT CHANGE
O	9-4	4 7/8	BANISTER CONTIN	-1/8 - 2.50
O	25-14	14	BOOTHE COMPUTER	-2 - 12.50
O	8-4	4 1/8	BRESNAHAN COMP.	-5/8 - 13.16
O	8-3	3 1/4	COMPUTER EXCHANGE	-3/4 - 18.75
O	18-4	5 1/4	COMPUTER LEASING	---
O	15-3	3	CYBER-TRONICS	-1 1/4 - 29.41
N	32-6	7 7/8	DATA PROC. F & G	+1/8 + 1.61
O	8-4	4 1/4	DATRONIC RENTAL	---
A	24-10	10 5/8	DEARRORN COMPUTER	-2 - 15.84
O	8-4	4 1/2	DIEBOLD COMP. LEAS.	-3/4 - 14.29
A	10-4	4 1/4	DPA, INC.	-1/2 - 10.53
A	22-8	9 3/8	GRANITE MGT	-3/4 - 7.41
A	44-6	6 1/2	GREYHOUND COMPUTER	-1/2 - 7.14
N	30-8	8 5/8	LEASCO DATA PROC.	-3 1/8 - 26.60
O	5-2	2 3/8	LECTRO COMP LEAS	-7/8 - 26.92
A	19-3	3 1/8	LEVIN-TOWNSEND CMP	-1 1/8 - 26.47
O	3-1	1 3/4	LNC DATA, INC.	-1/2 - 22.22
O	4-1	2	MANAGEMENT ASSIST	-1/4 - 11.11
O	8-5	5 1/4	NCC LEASING	-3/8 - 6.67
O	8-3	3 1/2	SYSTEM CAPITAL	-3/8 - 9.68
A	19-10	10 5/8	U.S. LEASING	-2 - 15.84

## PERIPHERALS & SUBSYSTEMS

EXCH	1970 RANGE	CLOSING PRICE	WEEK NET CHANGE	WEEK PERCENT CHANGE
N	62-25	26	ADDRESSOGRAPH-MULT	-4 3/4 - 15.45
O	15-3	3 7/8	ALPHANUMERIC	-3/4 - 16.22
N	48-15	16	AMPEX CORP	-2 5/8 - 14.09
A	34-5	6 1/2	ASTRODATA	-2 1/8 - 24.64
O	11-6	6 3/4	BOLT, BERANEK & NEW	-1/2 - 6.90
N	14-7	7 1/8	BUNKER-RAMO	-1 - 12.31
A	33-13	15 1/4	CALCOMP	-1 1/8 - 6.87
O	13-4	6 1/2	COGNITRONICS	-1/4 - 3.70
O	12-5	5 3/4	COLORADO INST.	-7/8 - 13.21
O	36-11	11	COMPUTER COMMUN.	-4 - 26.67
A	12-3	3 3/4	COMPUTER EQUIPMENT	-1 3/8 - 26.83
A	28-15	15 1/4	COMPUSET	-3 3/4 - 19.74
A	25-7	8	DATA PRODUCTS CORP	-5 1/4 - 39.62
O	23-7	7 1/2	DATA TECHNOLOGY	-1 1/2 - 16.67
O	13-5	5 1/2	DIGITRONICS	---
N	40-11	11 7/8	ELECTRONIC M & M	-4 1/8 - 25.78
O	8-4	4 1/4	FARRI-TEK	---
O	17-3	3 1/2	FARRINGTON MFG	-1/2 - 12.50
O	20-6	6	INFORMATION DIS	-1/4 - 4.00
A	67-23	23 5/8	MARSHALL INDUSTRIES	-3 1/4 - 12.09
A	84-17	17 1/2	MILGO ELECTRONICS	-9 3/8 - 34.88
N	87-37	40 1/2	MOHAWK DATA SCI.	-1 3/8 - 3.28
O	52-16	20	OPTICAL SCANNING	+4 + 25.00
O	17-4	6 1/8	PHOTON	-1/8 - 2.00
O	4-1	2	PHOTO-MAGNETIC SYS.	+1/4 + 14.29
A	42-25	26 1/2	POTTER INSTRUMENT	-2 1/8 - 7.42
O	25-12	12	PRECISION INST.	-1 - 7.69
O	83-24	24	RECOGNITION EQUIP	-3 - 11.11
O	34-11	11 1/4	REDCOR CORP.	-2 - 15.09
N	29-10	10 3/4	SANDERS ASSOCIATES	-1 1/2 - 12.24
O	53-9	9	SCAN DATA	-1 - 10.00
O	23-10	11	TALLY CORP.	+1/2 + 4.76
N	25-12	12 1/2	TELEX	-3 7/8 - 23.66
O	50-9	11 1/4	VIATRON	+1 1/2 + 15.38

## SOFTWARE & EDP SERVICES

EXCH	1970 RANGE	CLOSING PRICE	WEEK NET CHANGE	WEEK PERCENT CHANGE
O	6-2	2 3/4	ADVANCED COMP TECH	---
A	24-4	4 1/4	APPLIED DATA RES.	-1 3/8 - 24.44
O	18-5	5 1/4	APPLIED LOGIC	-1 - 16.00
O	8-1	1 3/4	ARIES	-1/4 - 12.50
A	47-25	26 1/8	AUTOMATIC DATA PROC	-2 7/8 - 9.91
O	14-6	6 1/2	AUTO SCIENCES	-1/2 - 7.14
O	9-2	2 1/4	BRANDON APPL SYS	-1 - 30.77
O	3-1	1 1/8	COMPUTER AGE INDUS.	+1/8 + 12.50
A	12-3	3 3/8	COMPUTER APPL	-1 1/4 - 27.03
O	14-4	4	COMPUTER ENVIRON	---
N	10-3	4	COMPUTER INDUS.	-4 - 50.00
O	13-4	4	COMPUTER NETWORK	-1/2 - 11.11
O	15-6	6 3/4	COMP. PROPERTY	-1 3/4 - 20.59
N	34-9	9 7/8	COMPUTER SCIENCES	-1 1/8 - 10.23
O	8-4	4 1/2	COMPUTER USAGE	-3/8 - 7.69
A	75-20	21 1/8	COMPUTING & SOFT	-6 3/8 - 23.18
O	9-3	3 1/8	COMRESS	-1/8 - 3.85
O	14-3	3 3/4	COMSHARE	-1 1/2 - 28.57
O	3-1	1 1/4	CONSOL. ANAL. CENT.	---
O	24-6	6 1/2	DATA AUTOMATION	-1/4 - 3.70
O	28-12	12 1/2	DATA PACKAGING	-1 1/4 - 9.09
O	6-2	2 3/8	DATAMATION SERVICE	---
O	9-5	6 1/4	DATATAB	-1/4 - 3.85
O	4-1	1 3/4	DIGITEK	-1/4 - 12.50
O	13-5	5 3/4	EDP RESOURCES	-1/2 - 8.00
A	11-5	5 7/8	ELECT COMP PROG	-1/8 - 2.08
O	161-50	50	ELECTRONIC DATA SYS.	-4 - 7.41
O	20-5	5 1/4	INFORMATICS	-5/8 - 10.64
A	25-7	7 5/8	ITEL	-1 3/4 - 18.67
O	7-1	1	LEVIN-TOWNSEND SERV.	---
A	25-13	13 1/2	MANAGEMENT DATA	-2 - 12.90
O	8-3	3 1/2	NAT COMP ANALYSTS	---
O	12-3	3	NAT. COMP. SERV.	-2 - 18.18
N	54-15	15 1/2	PLANNING RESEARCH	-4 3/8 - 22.01
O	27-11	11	PROGRAMMING METHODS	-1/2 - 4.35
O	5-3	3	PROGRAMMING & SYS	---
O	33-3	3 3/4	PROGRAMMING SCIENCES	-4 - 51.61
N	14-4	4 7/8	SCIENTIFIC RESOURCES	-1 - 17.02
O	2-1	1	SOFTWARE SYSTEMS	---
O	27-8	8	TBS COMP CENT INC.	---
O	4-2	3 5/8	UNITED DATA CENTER	-1/8 - 3.33
N	99-20	21 1/8	UNIVERSITY COMP.	-5 - 19.14
A	20-5	6 5/8	URS SYSTEMS	-1 3/8 - 17.19
O	13-5	6	U.S. TIME SHARING	+1/4 + 4.35

## Earnings Reports

### VICTOR COMPTOMETER CORP.

Three Months Ended Mar. 31

	1970	1969
Shr Ernd	\$ .30	\$ .39
Revenue	39,629,907	37,266,824
Earnings	1,581,134	2,059,517

### CINCINNATI MILACRON INC.

Three Months Ended Mar. 28

	1970	1969
Shr Ernd	\$ .81	\$ 1.01
Revenue	70,071,000	68,415,000
Earnings	2,968,000	3,673,000

### COMPUTER COMMUNICATIONS, INC.

Nine Months Ended Mar. 31

	1970	1969
Shr Ernd	\$ .33	\$ (.05)
Revenue	6,975,414	4,390,194
Earnings	402,269	(54,758)

a-Restated. This report is unaudited.

### COMPUTER INSTRUMENTS

Three Months Ended Apr. 24

	1970	1969
Revenue	\$1,757,716	\$2,066,503
Loss	54,648	87,031

### LECTRO COMPUTER LEASING

Three Months Ended Mar. 31

	1970	1969
aShr Ernd	\$ .15	\$ .10
Revenue	329,500	156,500
Earnings	65,100	32,700

a-On a primary basis. Per share earnings on a fully diluted basis were 13 cents in 1970 and 10 cents in 1969.

### PROGRAMMING METHODS, INC.

Three Months Ended Mar. 31

	1970	1969
Shr Ernd	\$ .14	\$ .11
Revenue	1,281,538	1,029,768
Earnings	122,121	94,136

### DATRONIC RENTAL CORP.

Nine Months Ended Mar. 31

	1970	1969
Shr Ernd	\$ .28	\$ .30
Revenue	2,292,570	2,056,296
Earnings	192,205	168,290

The figures are subject to year-end audit.

### MANAGEMENT ASSISTANCE

Three Months Ended March 31

	1970	1969
Revenue	\$16,402,000	\$18,825,000
Spec Cred	a2,160,000	.....
Earnings	b1,071,000	c195,000
6 Mo	.....	.....
Revenue	32,985,000	36,383,000
Spec Cred	a2,160,000	.....
Loss	41,000	512,000

a-Represents the minimum amount payable on or before Aug. 31, 1974 by Potter Instrument Co., as a result of the previously announced settlement of arbitration and litigation proceedings. b-Equal to 21 cents a share. c-Loss.

### MILGO ELECTRONIC CORP.

Six Months Ended Mar. 31

	1970	1969
aShr Ernd	\$ .52	.....
Revenue	6,772,000	\$3,290,000
Spec Cred	440,000	280,169
bEarnings	1,224,000	281,263

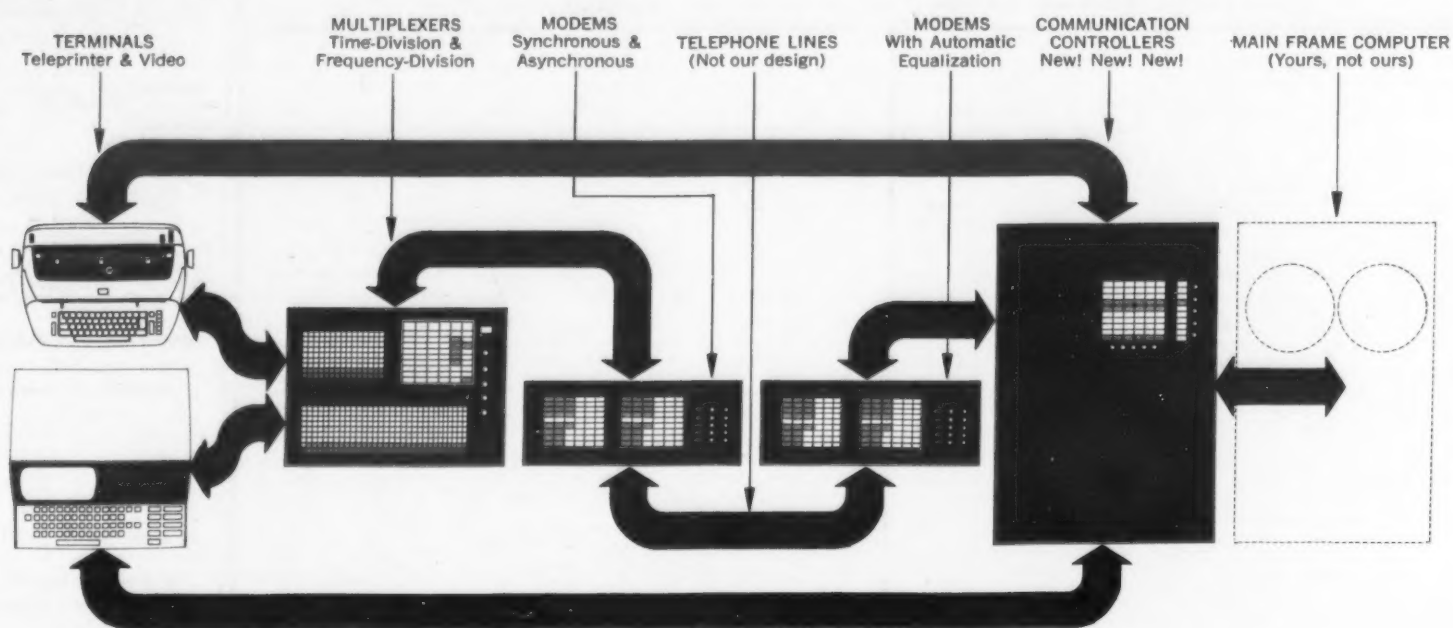
a-Based on income before special credit and on shares adjusted to reflect 100% stock dividend in March, 1970. b-Equal to 81 cents a share in 1970 and 20 cents a share in 1969.

### COMPUTER DIMENSIONS, INC.

Three Months Ended Mar. 31

	1970	1969
bShr Ernd	\$ .07	\$ (.17)
Revenue	1,216,583	934,314
Earnings	85,842	(155,501)

a-Unaudited figures for period ended March 31, 1970. b-1970 based on 1,550,257 shares outstanding and 1969 based on 1,184,907 shares. All figures restated to reflect a pooling of interest with Investment Control, Inc., acquired on May 4, 1970.



ONLY ADS can offer you the system study, software, hardware and field maintenance to move data from fingertips to readout — hard copy or video.

*ADS HARDWARE includes terminals, multiplexers, modems and communication controllers:*

TERMINALS include a hard copy teleprinter and a video terminal useful for data display, remote computer operation and "instant" data transmittal. The teleprinter operates in three code-modes at the flick of a switch: ASCII, BCD, and Correspondence. It is self contained within a standard typewriter case. Off-line storage is offered for both units via a magnetic cassette unit.

MULTIPLEXERS & MODEMS by ADS save telephone line costs, simplify system design, and feature complete front panel diagnostic display — an ADS exclusive. Various channel capacities, intermixed baud rates, byte-interleaved, bit-interleaved, with full contention, automatic baud rate detection, and automatic modem equalization.

COMMUNICATION CONTROLLERS at the computer end of the teleprocessing network receive, store, and route data messages. Data is fed to and from the computer appropriately addressed, in proper sequence, with minimum delay.

SOFTWARE & MAINTENANCE are provided with all ADS hardware.

In Data  
Communications  
Systems  
**American  
Data  
Systems**  
provides  
"Everything"

**Ads**

Telephone: (213) 882-0020

AMERICAN DATA SYSTEMS

8851 Mason Street, Canoga Park, California 91306

DATA MODEMS □ DATA MULTIPLEXERS □ DATA TERMINALS □ DATA SYSTEMS